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EDITORIAL NOTES.

The Initiative Work of the Institution Council.

THE annual report of the Council of the Institution has been distributed; and it comes to us with all the familiarity of an old staid friend. Passing over the introductory paragraphs, the subjects treated upon have mostly had place at some time or other in former annual reports; and there are not any of them that, so far as the report discloses, have made much progress. There is one thing of which the best friends of the Council of the Institution cannot accuse them, and that is of showing any conspicuous amount of initiative in their corporate work for the gas industry, though in connection with their own individual undertakings there is no lack of the quality. Indeed, were it not for the punctilious manner in which the Refractory Materials Committee follow up the duties entrusted to them, and were it not for what is done by the delegation of work to the Leeds University, the annual report of the Council would often be a dejected and barren affair.

For confirmation of the point as to the want of actual initiation by the Council of work for the industry, let us examine the contents of the report before us. Early in it reference is made to the examinations in "Gas Engineering" and "Gas Supply." The Council only act in an advisory capacity in connection with these examinations. The next paragraph deals with the education and certification of gas-fitters. The inception of this matter did not rest with the Council. Next we have a report by the Carbonization Committee, which body was the issue of a letter written in 1904 by Mr. Charles Carpenter, though he did not actually suggest carbonization as a subject for investigation. The work of the Refractory Materials Committee is next alluded to. This Committee was the outcome of the paper read by Mr. F. J. Bywater before the Institution a few years ago. The Institution Gas Research Fellowship is next mentioned. The Council may perhaps take credit for the origination of the fellowship. Allusion is made to the Ventilation Research Committee, which is said to have been "proposed" by the Council last year. In his letter in 1904, Mr. Carpenter suggested that an investigation should be conducted on the influence on health of lighting and warming by means of gas. At the meeting of the Institution in 1910, Professor Arthur Smithells, the Chairman of the new Ventilation Committee, pointed to the importance of an authoritative inquiry in relation to the gas-stove from the hygienic standpoint, in order to remove any prejudice that might remain among the public; and he then said he felt almost inclined to tackle the work single-handed. A paragraph that succeeds refers to the appointment of a Gas-Heating Advisory Committee, which opens by stating that the Council "recognizing the desirability, in the in-"terests of a standard method of testing gas-fires," &c. The "desirability," we rather fancy, was recognized in these columns before the Council took up the matter; but some of the very gentlemen who have been appointed to serve on the Committee scoffed at the suggestion, and in the same breath acknowledged that they were seeking for something better than the Leeds test. Following on there are references in the report to the standard specification for street lighting, to the International Commission on Illumination, to the International Commission on Screw Threads, to the National Insurance Act, 1911, to Canal Traffic, to the Departmental Committee on the Smoke Nuisance, to the General Engineering Research Committee, and to the International Engineering Congress—not one of which matters had their origin with the Council of the Institution. There is also a reference to the Proposed National Gas Committee. Again, the original idea of a central representative organization did not emanate from the Council. Finally there is an allusion to the National Gas Congress and Exhibition, the initial suggestion in connection with which was made, we believe we are right in saying, first to the Council, as one means of celebrating the Institution Jubilee.

When the matter contained in the report is investigated in this way, the small initiative work that can be claimed by the Council is somewhat surprising. The policy of "waiting "for something to turn up" has manifestly strong hold. Instead of being an active initiating body, it is found that in the main the Council only fulfils the functions of an intermediary and participating body. It stands between the units of the gas industry and other bodies who do initiate and who do perform; and, in this intermediary capacity, there is always an amiable willingness on the part of the Council to participate in conferences and work through delegates appointed by them. We, and many members of the gas industry, would like to see the Council of the recognized chief organization of the gas industry taking a stronger lead, rather than for the most part constantly being led. Until this happens, the Institution will never take the place among the other technical, professional, and industrial bodies that the status of the industry financially, commercially, and technically should command for it. It was partly for this reason that we had hoped that the proposed National Gas Committee would have soon—through the conferences of the representatives of the three most powerful organizations of the industry—been an accomplished fact, without stripping any one of the bodies of its individuality and liberty of action. We are glad, however, to see that hope of an eventual success has not been altogether abandoned, though the present view is that the matter is not ripe for determination; the consequence being that its further consideration has been deferred for revival in the unknown future. We have held the view, and still entertain it, that circumstances have fully matured when, in the interests of the gas industry, there should be a joint representative advisory body, also holding sufficient power to act promptly when demanded by circumstances of an emergency order in which the whole industry is concerned. There is no such joint body at the present time. There is no strict line of demarcation between the work of the various bodies; and, without going through a circuitous process, the three main bodies of the industry do not know what (if anything), in any particular matter in which all are concerned, is being done by the other bodies.

If there is not a change, one of these days, the industry will find itself (to use a colloquialism) "let down" by the inconclusive division of responsibilities, and the want of any joint action, that now exist. There is for instance, the Gas Companies' Protection Association on the one hand, and there is the Parliamentary Committee of the Institution on the other. We know they sometimes act mutually; but the other bodies—the Society of British Gas Industries and the British Commercial Gas Association—have no knowledge of what these bodies are doing in any case in which the interests of the members of these organizations may be involved. The Parliamentary Committee of the Institution is, in truth, one of the most conservative of bodies, and no one finds out much as to what it is doing. In the report of the Council last year, the only reference to the work of the Committee was that "in addition to the various matters referred to in "the foregoing which have received the attention of the "Parliamentary Committee during the past year, other "questions have been dealt with, some of which are now "under consideration." We turn to the newly-issued report of the Council to ascertain the nature of the matters that were "under consideration" twelve months ago. What do we find? An excellent illustration of an economy of words, and not a molecule of anything that is informative. "Various important subjects," we read, "have received the "consideration of the Parliamentary Committee during the "past year, some of which are still engaging their attention." Never a word as to what the subjects are, and rarely a word as to the fruits of all this patient and persistent consideration. Perhaps in due season we shall know definitely what

were the subjects that were engaging the Committee a year ago, and what are those that are still receiving attention. Of course, we can guess what are the subjects that ought to be engaging attention, and no doubt are. However, as things are just at present, there can be no proper co-ordination of work, and no assurance that all interests in the industry are safeguarded. But there may be under the circumstances a great waste of energy and time.

The report, generally speaking, is an indication of the position of the various matters dealt with. Before making brief allusion to some of these, we should, in passing, like to congratulate our friends at Birmingham upon the awards gained for the papers presented at last year's meeting. Birmingham supplied the principal technical fare for discussion at the Jubilee meeting; and Dr. Davidson well deserves the "London" Gold Medal and the Institution Silver Medal, while Mr. Chaney is justly entitled to the Institution Gold Medal. Mr. Goodenough has had bestowed upon him the Bronze Medal. It is satisfactory to find that the machinery for the examination and certification of gas-fitters has at last been completed. It has seemed an almost interminable job to get this through; and although all who have interested themselves in the matter have not got precisely what they wanted, it is for them and others to make the best possible use of the scheme in its present shape. The selection by the Council of Mr. H. Kendrick and Mr. Ralph Halkett as co-examiners in this connection is sure to meet with approval. The dissolution of the Carbonizing Committee is a fitting proposal for a not very glorious career. The inability of the Committee to accomplish much has been partly due to circumstances which they could not control, and partly, in some years, to commencing (without having done anything) the question of the consideration of their report at about the eleventh hour before the meeting. The Carbonization Committee have also, on their own confession, shown an excellent aptitude for delegating their work. We shall at the annual meeting look for an interesting report from the Refractory Materials Committee, whose work somewhat limited the scope of the Carbonization Committee; and now that this Committee is about to dissolve, the Refractory Materials Committee might perhaps also be deputed to keep an eye on carbonization movements. The report intimates that the Leeds University will again contribute some interesting matter at the meeting, including a preliminary report by the Ventilation Committee. The Gas Heating Advisory Committee will have the good wishes of all, as there was distinct regret when the work of the Gas-Heating Research Committee was discontinued, on the translation of Mr. E. W. Smith to Birmingham. The Joint Committee on a Street Lighting Specification still appear to be very far from agreement; but for dealing with the final proposals the Council have strengthened the representation of the Institution. Good work in which the Institution is joining will no doubt be done by the International Commission on Illumination, as well as by the National Committee formed for the collaboration of the interested organizations in this country. Regarding the Departmental Committee on Smoke Nuisance, the Council report that the question of offering evidence on behalf of the gas industry is receiving their consideration. Seeing that the Departmental Committee have started their sittings, it is hoped that at the date of the report—May 29—the Council had got beyond the "consideration" stage, and had taken active measures to have the gas industry represented. With reference to the International Engineering Congress to be held in San Francisco in 1915, care should be taken that, if the Institution and gas engineering are represented at all on that occasion, it is by some one or more representatives of position in the industry.

A Tottenham Gasholder Contract Secured by a German Company.

"We [the gas undertakings] must stand out for our right "to buy in the cheapest market that commends itself to our "unfettered judgment—as you will do." These words, employed little more than a year ago by Sir Corbet Woodall, D.Sc., in his Presidential Address to the Society of British Gas Industries, return to mind with intensified force as we receive information from Mr. A. E. Broadberry, the Engineer and Manager of the Tottenham District Light, Heat, and Power Company, to the effect that the Directors have, in the exercise of right and duty, entered into a contract for a gasholder of no less than 6¾ million cubic feet capacity with the Berlin-Anhaltische Maschinenbau-Aktien-Gesellschaft, the initial letters of which title give us the more familiar designation of the powerful German engineering concern—the "Bamag" Company. This contract is for one of the largest gasholders that has for some time been erected in or near London; and there is a very natural feeling of keen regret on our part that a firm established in this country did not get the work, on the ground that we prefer the work produced by our own communities being kept as far as possible at home. There is little doubt, too, that this success on the part of the Bamag Company will, in the immediate future, have an influence upon the consideration of other British gasholder contracts. All this has been well in the minds of the Directors and Engineer of the Tottenham Company; and with them the conflict has been strong between their native attachment and prejudice and their duty to a *quasi*-public concern, in which exists the triple alliance of the consumers, the stockholders, and the workmen co-partners.

Before the step was taken which has placed such a large British gas-works contract in the hands of a German firm, the home gasholder contractors cannot (so far as our information goes) deny that every chance was given to them to secure the contract. If they can, or if there is any other explanation to make, we shall be pleased to publish anything that they may have to say concerning the matter, as our interest lies not on the side of one party or the other, but on the independent line midway between the two. What in the first place appears to have happened is that the slender differences between the offers of the British firms were such that the Directors of the Tottenham Company could only accept them as a mere pretence at competition; or, if they were really competitive offers, then tendering in the engineering world has arrived at the position of an art of such fine degree and mathematical precision that the Directors utterly failed to grasp the truth of the position. The determining factor, however, was not the proximity of the tendered British prices. It was that, on the same drawings and specification, a firm so distant as the Bamag Company, with stretches of sea and land to negotiate between them and Tottenham, were in the position to offer to carry out the contract at something between £3000 and £4000 less than the lowest British tendering firm. This is a substantial difference. The difference is one that accentuated the doubt in the minds of those responsible for the conduct of the Tottenham Company as to the genuineness of the British competition in regard to prices. With the Bamag Company willing to enter into all guarantees, and to comply with the tests of material and conditions, the Directors of the Tottenham Company, in view of their fiduciary position, could not ignore that saving.

However, it could not have been a pleasurable thing for the Board to have to put the Company's seal to a large contract going away from our shores; but there was no alternative. They did, under the circumstances, the best thing in the way of supplementary conditions, to which the Bamag Company willingly acceded. Stipulations were agreed to which retain for this country some benefit in the contract, and remove all argument as to cheaper labour and materials being employed than currently obtain in this country. While the steel plates may come from Germany, they will be subjected here to all the prescribed tests. The cast iron required will be purchased in this country. The foreman and a few men to be engaged on special work will come from Germany; all the other men will be British workmen. The rate of wages will be those recognized by the Tottenham Urban District Council for all men employed under Council contracts. In face of this information, one cannot see any point on which the German Company secure any advantage over the British contractors; on the contrary, their works and centre of operations being in Germany, it appears to us that they are comparatively under a distinct disadvantage. Yet their tender is lower by three or four thousand pounds! Meantime, we know that the Bamag Company have had under consideration the question of establishing themselves permanently in this country; and we cannot help thinking a success such as this one at Tottenham will have some weight in their consideration.

In the course of a letter received from the Engineer of the Tottenham Company (after the foregoing article had been put in type, as the result of a conversation with him last Wednesday), Mr. Broadberry wrote: "Even the Americans were "able to show their ability to compete with the present "prices being demanded by the British firms, by the fact that "the lowest American tender was well under the highest

"English one. It was not without a considerable amount "of regret that my Directors felt bound to place the order "out of the country; but, having invited the international "competition, and having received the best tender from a "firm whose reputation for good work stands absolutely "unchallenged, they felt themselves unable to withhold the "prize which had been so fairly won."

One View of "Field's Analysis."

We have received from the compiler of "Field's Analysis"—Mr. William Blakey, Accountant to the Gas Light and Coke Company—a copy of the issue for 1913; and our opening words must be of congratulation to him on the additional interest and usefulness with which he has invested the publication. In the first place, it is seen that he has inserted a column giving the prescribed and (or) supplied gross thermal value of the gas distributed during the year; but as there are such a few undertakings that have yet a prescribed standard for calorific power, we doubt the expediency, before going to Parliament, of publishing the figures as to the calorific power of the gas supplied by those who are not yet working under a standard. There is the danger of such publication being used in evidence against the undertakings. That is the only adverse criticism of the "Analysis" that has to be made. For the rest there is nothing but praise. There is now an appendix in which the amount of gas sold per ordinary and prepayment consumer (we do not like the term "automatic consumer," being content to let meters be the automatic things) is set out, as well as the numbers of stoves on hire, and the percentage of stoves on consumers. Mr. Blakey has done good service to the gas industry in preparing and presenting this new feature, as we feel confident that it must have the effect of activating work in this connection where the figures show additional developing energy is most needed. Elsewhere are found as new features the rental of fittings set out, and the receipts for ammoniacal liquor per butt of 10-oz. strength. Gas-fittings expenditure is also now quoted; and a useful division is made between wages on coal gas and on carburetted water gas. Coal and working expenses have also been calculated to a percentage on income and on net rental. There are some minor changes, but those specified are sufficient to indicate that the ranges of serviceableness and merit have been extended.

The side of the "Analysis" that primarily attracts us on this occasion is the evidence that the work of the compiler supplies as to the healthy trend of things in the industry generally in the matter of the relation of capital to business done. The year 1913 was not, generally speaking, such a good one for consumption development as its predecessor. But still there was progress, and of a satisfactory order. Nearly all along the line—in London, in the Suburbs, and in the Provinces—we find the capital decreasing per 1000 cubic feet of gas sold. The amounts of reduction vary. In London, 1d. and 2d. represent the reductions; in the suburbs 3d., 4d., and Lea Bridge (the capital of which undertaking still stands the highest per 1000 cubic feet among suburban undertakings) excelled itself by knocking 10d. off its average. The Mitcham Company having dropped out on the fusion (along with Epsom) with the Wandsworth Company, it is found that the last-named Company has given up its place of being the lowest capitalized London or suburban gas undertaking on the basis of gas sold. From the Wandsworth 6s. 8d. of 1912, the Amalgamated Company stands with 7s. 3d. as its average capital per 1000 cubic feet sold in 1913. Brentford, however, is the only suburban company beating it with 7s. 2d.; having receded by 5d. in the one year. There will be a tussle between these two concerns in future for supremacy in lowness of capital in relation to business. Without exception, the ten provincial corporations dealt with show a decline in their outstanding capital per 1000 cubic feet. It makes the administrative mouth water to see such a capital as 1s. 1d. per 1000 cubic feet for Carlisle, 3s. 10d. for Manchester, and 4s. 6d. for Birmingham. But the other figures have not much of which to boast in comparison with those of the nine provincial companies whose accounts are analyzed. With two exceptions, the average capital of these concerns has also declined. The Sheffield Company with its 4s. 4d. beats the Birmingham Corporation by 2d. Regarding Scotland, Glasgow is low with 4s. 8d.; but Edinburgh is high with 18s. 11d., largely owing to the considerable expenditure involved in closing the old works, and constructing entirely new ones at Granton. The capital per 1000 feet of the Dublin Company has gone up 10d.—from 18s. 5d. to 19s. 3d.

The extension and consolidation of business in relation to capital employed is presented in another form. The work of business development among existing consumers is telling upon capital in a very emphatic manner; and this is to the advantage of the industry. In the case of the three London Companies, the mileage of mains increased during the year by 26, making the total 4202. The average amount of gas sold per mile of main was 10,453,000 cubic feet, or an addition to the previous year's average sale of 36,000 cubic feet. In the case of the eight Suburban Gas Companies, the mileage of mains increased by 96, to 1940; and the average quantity of gas consumed per mile was 6,465,000 cubic feet, which shows the fine increase of 81,000 cubic feet. The ten Provincial Corporations make the worst showing of all per mile of main. Their increase in mileage was 55; making the total 4869. Their average consumption per mile was 5,703,000 cubic feet, or an increase of 211,000 cubic feet. It is pretty certain that, speaking generally (and asking forgiveness of the more progressive municipal concerns for rolling them up in the average), the Corporations have not hitherto adopted trade-boosting tactics of an effectiveness equal to those of gas companies generally. But the 211,000 cubic feet increase per mile of main tells of a more enlightened policy and increased activity. Birmingham stands extraordinarily well with its average of 10,497,000 cubic feet per mile of main; and its increase of 648,000 cubic feet per mile on the year. Leicester has a good showing per mile—7,231,000 cubic feet. Glasgow should be complimented upon the fresh flesh it put on per mile during the year—434,000 cubic feet; making the average per mile 6,672,000 cubic feet. The nine provincial companies make a better showing than the corporations taken together per mile of main. The provincial companies added 36 miles of mains to their aggregate systems; making the total length 2766 miles. The average sale per mile of main was 6,097,000 cubic feet; giving the excellent increase of 255,000 cubic feet in the year. The Alliance and Dublin undertaking dropped its sale per mile, by 69,000 cubic feet, to 2,209,000 cubic feet. But Dublin last year suffered torments and industrial lethargy through the attentions of Mr. Larkin and those who operated with him in creating and maintaining the great strike of labour in the city.

A few more figures ought to assist some quarters of the industry to stir up, and not be left in the background, as by data comparison they are shown to be at present. In the case of the three Metropolitan Companies, the average consumption in 1913 per ordinary consumer was 68,410 cubic feet, and per prepayment consumer 16,516 cubic feet. In the case of the Suburban Gas Companies, the ordinary consumers made demand up to an average of 50,966 cubic feet, and the prepayment consumers up to 18,045 cubic feet. The Provincial Companies returned an average of 46,845 cubic feet per ordinary consumer, and 14,304 cubic feet per prepayment consumer. The Provincial Corporations again came out bottom with an average of 40,761 cubic feet per ordinary consumer, and 13,159 cubic feet per prepayment consumer. Working the figures out to the average per consumer irrespective of class, we have for the metropolitan consumers 33,849 cubic feet, against 34,396 cubic feet in 1912; for suburban consumers, 30,866 cubic feet, against 30,682 cubic feet; for the provincial company consumers, 33,448 cubic feet, compared with 32,582 cubic feet; and for the provincial corporation consumers, 29,834 cubic feet, as compared with 28,736 cubic feet. What is the cause of the lower showing by the municipal gas undertakings grouped together? Local conditions, of course, are partly responsible; but we are inclined to think, after studying the section of the appendices referring to the number of stoves on hire, that the differences are largely attributable to the hesitating policy of certain municipalities in regard to gas-stoves. The average percentage of stoves on hire on the total number of consumers in the case of the London Companies is 81—the South Metropolitan Company leading with 95. The percentages in the case of the Suburban Companies run from 42 up to 90. Among Provincial Companies Sheffield is the lowest with only 9 per cent. on hire; the other provincial companies running from 55 to 92 per cent. The Corporations are bad in this respect. Bradford can boast of only 1 per cent., Carlisle 7 per cent., Salford 9 per cent., and Leeds 15 per cent. There are four of the under-

takings with percentages round about 40; Birmingham can claim a percentage of 68; and Leicester heads the municipal list with 88 per cent. Herein seems to be one of the causes for the backwardness, taken in the aggregate, of the municipal authority gas undertakings, in respect of the average consumption per mile of main and per consumer. A study of the "Analysis" must do good in the way of stimulating efforts to promote the consumption per mile of main and per consumer—ordinary and prepayment—in order to get as near as possible to the best achievement, making allowance for the differences in local social conditions. Be that as it may, the data supplied by Mr. Blakey show that the business of the gas industry is, on the whole, taking a very salutary course.

A few words in conclusion, specially referring to the Alliance and Dublin Gas Company. It will be remembered that Mr. H. E. Jones, in a letter in our columns on April 21 last, stated that the figures given in the "Analysis" for the distribution expenses of the Company did not represent the true amount by something like 2½d. per 1000 cubic feet. He was referring to 1912, when the figure was quoted as 5·43d. per 1000 cubic feet. It stands for 1913 at 7·47d.! It is true there has been a falling off in consumption; but the total of the distribution expenses stands much higher for last year (£44,260) than for the preceding one (£33,786).

Coke for Steam-Raising.

Careful readers will have observed that in last week's "Journal," there were no less than three distinct references to the subject of the utilization of coke for steam-raising; and if last quarter's index is consulted, it will be seen that the topic has had in our columns quite a considerable amount of attention bestowed upon it during the past few months. Adversity is stimulating to some spirits, especially those of the optimistic order; and we must say that those who executively have a great deal to do with the maintenance and furtherance of the gas industry's fortunes have been, as a rule, properly endowed with this invaluable quality. Adversity in the matter of coke sales last year has had a stimulating effect in promoting a survey of the possible grounds for new markets; and the activity of the London Coke Sales Committee, it should be said, has had something to do with energizing matters in this direction. For any commodity, it is an excellent thing, so far as price maintenance is concerned, to have markets that are rather in excess of than under the supply; and so the larger the area of the combined markets for coke, the better. If we take together the articles that have been published in our columns concerning this matter of the use of coke for steam-raising, it will be remarked that the case presented has been completely favourable to the cultivation of this large industrial opening for the coke produced by the gas industry; while care has been exercised to ensure that the figures presented and the statements made were such that they could readily be put to the test of practical experience. There has not been a single dissentient to any of the assertions made; but two eminent electrical station engineers—Mr. A. Hugh Seabrook and Mr. J. Horace Bowden, both large users of fuel for steam-raising—have by the articles been drawn into our "Correspondence" columns regarding the one point as to whether any possible damage can arise to the tubes of steam-boilers in excess of what is occasioned by the use of coal. The inquiry was put by Mr. Seabrook. It was answered by us, and support to the answer, to the length of his experience, was given by Mr. Bowden, who promised that, in due season, he would supply our readers with details of further experience. We hold him to the fulfilment of this promise when he has completed his investigations.

Let us briefly review the case that has been presented in favour of the cultivation of the considerable industrial market for the utilization of coke for steam-raising. Broadly, it has been divided into four parts. Firstly, the general advantages to factories, electric generating stations, and communities; secondly, the conditions under which the most effective use can be made of coke; thirdly, the question of evaporative efficiency has been dealt with; and fourthly, the point as to possible damage to boilers has been answered. The aspect of the subject in relation to the scope of the industrial market does not demand specific notice; industry in which steam is used being about us in every direction. Touching this aspect, however, there was rather a striking point made in one of the articles in the "Journal" last week, and that was that in some cities and towns where the municipality run the gas-works, and the other services appertaining to civic life—such as the water supply, the electrical station, and the sewage works, in each of which steam-raising is a common function (if not always a necessary one in these days of gas-engines)—the authorities pursue the anomalous course of going afield for smoke-producing fuel, while within their own civic system they are daily producing a smokeless fuel which can be used without reducing, but, on the contrary, slightly increasing, the evaporative duty of their boilers. This is a condition that should be altered; and in thus pointing to it, there are at the same time expressed some of the general advantages to factory owners of a valuable fuel supply constantly available at their own doors, and a fuel which will not cause that frightful contamination of the atmosphere that is occasioned by the use of raw coal. It was said in one of the speeches at the luncheon given to the Manchester Institution last Saturday week by the Manchester Corporation Gas Committee that the fact that there was still so much contamination of the atmosphere in certain places where the price of gas was low, despite its considerable adoption for power and heating, was due to the fact that people were still wanting in education as to these matters, and that it was so difficult to effect a cleavage from tradition. There is a deal of truth in this. There is the work that has to be done; and the municipalities ought to be the people to lead the way by example in reform, by discontinuing the purchase of coal for steam-raising, and by using the available smokeless fuel. There is probably not one out of every ten users of steam coal or slack who ever gives a thought to the fact that it is the considerable quantity of volatile matter that is in the fuel he uses that passes wastefully up the chimney, and contributes to the fouling of the air. The percentage of the volatile matter may be as high as 30 to 35 in coal, while, generally speaking, it is only about 2·5 per cent. in gas coke. The tyro in this subject of the constitution of fuel does not require more than such figures as these to show how, if he be a manufacturer requiring steam, he can contribute to the sanitary conditions of the atmosphere of his works' locality by using the fuel containing the smaller quantity of volatile matter. If he is not, owing to a debarring type of mechanical stoker, in the position to be an all-coke user, he can still, as the articles in our pages have shown, and shown from practical experience, in most cases be a user of part coke and part coal; and to the extent that he employs coke mixed with the coal, he will proportionately reduce the percentage of volatile matter in the total fuel—thus becoming a benefactor to his times and location.

In cultivating this industrial market, success will largely depend upon the most effectively productive methods being ascertained in applying the coke to steam-raising; and in assisting manufacturers in this matter, the London Coke Sales Committee did the wisest thing possible in appointing, as expert, Mr. E. W. L. Nicol to assist them. On gas-works, with hand-fired boilers, the use of coke is such a customary thing that little thought has been bestowed on the application of this fuel to the conditions existing in the boiler-houses of other industries. Where coke can be used alone, it is, as "Modus Operandi" showed in his notes last week, quite possible to increase the effective evaporative duty of boilers by studying the size of the coke used. This is an important point; and it is brought out in a paragraph (following a statement of the reasons) which we feel ought to be accentuated: "It is an undoubted fact," "Modus "Operandi" writes, "that a boiler fired by small coke will "evaporate with the same draught quite 30 or 40 per cent. "more water than one fired by large coke, though it will use "a proportionately larger quantity of fuel. If, however, the "size be reduced to too great an extent—the limiting line "being somewhere about ¾-inch cube—the air space between "the pieces becomes too restricted, and the burning capa-"city of the grate is diminished." It can well be understood that the closing of the interstices between the small pieces of coke by breeze and dust would affect the inflow through the bed of coke of the requisite supply of air for obtaining the most effective combustion; but, on the other hand, in the tests described on p. 584 with Babcock water-tube boilers (which demonstrated the higher efficiency than with coal alone to be realized with a mixture of coal and coke, as well as the practicability of burning coke on a chain-grate stoker, the proportion being 20 per cent. of coke), the tester reports: "The effect of introducing the coke next to the "grate-bars, and under the coal, is to obtain a free access "of air to the latter"—the coke used being "unscreened

"breeze containing *all sizes* up to about 1 inch cube." The conditions, of course, are totally different; but the two experiences show how conditions may affect the question of the size of coke employed. However, these and other tests prove that, with those types of mechanical stokers that are opposed to the use of coke alone as fuel, a mixture of coal and coke can be employed, and the evaporative capacity of the boilers will thus be raised. It will be seen that in these Babcock boiler tests during three days, using coal alone, the average quantity of water evaporated per hour was 10,377 lbs., and with the combination of coal and coke (20 per cent. of the latter) 10,568 lbs. was the figure. Tests with Cornish boilers using coke only were quoted in the "JOURNAL" for Feb. 17 last (p. 424).

The only fear that has been raised has been the one as to possible damage to boiler-tubes. This can be set at rest by the large experience in gas-works throughout the country, and by the fact that the insurance companies have no objection to urge against the employment of coke. It should not require very much consideration on the part of practical manufacturers to see that the treatment to which coal is exposed in gas-works must largely remove from it the constituent—volatile sulphur—that is the cause of deleterious effect on both metal and brickwork, and which treatment therefore supplies a fuel in the shape of coke that is of more general utility. This brief review of points that have lately been brought out in our columns cannot fail to give satisfaction as to the good scope there is in steam-raising for the disposal of coke, and as to the gas industry having a good fuel to offer to manufacturers requiring to make the best use of their boilers. But we have to penetrate the fixed habits of a long past.

Discs and Prepayment Meters.

When dealing with a case at the Manchester City Police Court a few weeks ago [see "JOURNAL" for May 5] in which a woman who had been repeatedly warned was summoned and convicted for having, by using discs or other tokens, fraudulently abstracted gas from a prepayment meter, the Stipendiary made the remark that "this practice of using discs must be stopped." The Stipendiary is right; the question is how best to stop it. The medium of the Law Courts is not a very satisfactory one; and it is one that, the culprits being poor people, gas suppliers are averse to having recourse to if they can possibly avoid it. But the question is, how is this to be done, as done it must be, seeing that the practice is a growing one; that it undermines the very principle of prepayment upon which the system is founded; that it adds to the difficulties and costs of collection; and that it creates a large amount of trouble with the poor consumers, whatever the cause of the use of the discs. A deterrent is wanted; but it seems that the Home Office and the Lord Chairman are opposed to assisting the gas industry in this matter. The Kidsgrove Gas Company ventured to try to obtain what is needed through the Bill they are promoting in Parliament this session, by asking for a clause to the effect that any person who caused or suffered to be placed in a prepayment meter, any disc, token, coin, or thing other than a coin of the value and denomination for which the prepayment meter is designed and intended shall be liable to a penalty not exceeding twenty shillings. The Home Office were unfavourable to the clause; the House of Commons Committee evidently considered it a useful one (as it was intended to be); but the Unopposed Bills Committee of the House of Lords would not allow it, despite the practical arguments of the Parliamentary Agent on the Bill, Mr. Arthur Lees.

Police Court or Deterrent.

The Home Office suggested that the Parliamentary Committees should carefully consider the clause on the ground—firstly, that there was no precedent for it; and, secondly, that it might be possible to deal with the matter under the Gas-Works Clauses Act, 1871, as a simple larceny. Regarding the point as to there being no precedent, it is for Parliament to create laws to meet new conditions; and as to proceeding against a consumer for simple larceny, as Mr. Lees pointed out, it is necessary that the offender should be caught in the act. In the Manchester case, the Stipendiary dismissed the summons for larceny, but convicted under the summons for fraudulently abstracting gas. It will be remembered that in February [last as reported in the "JOURNAL"] the Manchester Corporation charged a woman, who habitually disregarded the warning against using discs, with having obtained credit by means of fraud other than false pretences. But they did not succeed in that case. It is satisfactory, however, that they have done so in the more recent case on the summons for fraudulent abstraction of gas; and we hope that, having won this case, the Department will soon, through its influence, be free from the worry and vexation caused by the use of discs and tokens. The power that the Kidsgrove Company sought—the consumers being informed of its existence—would, we believe, have done much to put an end to the practice that has grown, and threatens to grow still more, in some localities. The slot-meter users have a contract with the gas suppliers in whose district they reside to prepay for the gas they use; and they ought to know that they run the risk of proceedings against them if they evade the main condition of their contract by obtaining gas without prepayment. While writing on this subject, a protest should be made against those traders who use for advertisement purposes coin facsimiles. In one of the Manchester cases, there were taken from the meter cardboard discs, on one side of which is an excellent reproduction of a penny, while on the other side are the words: "Take this to your grocer. Two Farola pennies entitle you to a 7d. packet of Farola for 5d. (only available for Farola)." The person who placed these discs in her "prepayment" meter preferred gas to "Farola." But the place where they were found shows that the provision of the advertisement discs suggested a fraudulent use.

Municipal Gas Supply Last Year.

In the further reports dealing with the operations during the last financial year of gas undertakings in the hands of local authorities, the effect of high coal prices (often accompanied by a lower yield from residual products) is very marked. For instance, at Coventry the net profit, at £12,300, is about £8000 less than was the case a year ago; an increase of £12,000 in the working expenses being accounted for to the extent of some £10,000 by the higher cost of coal. Wages, too, have cost more in Coventry than before—as has been the case with a great many other undertakings. However, the rates are to receive a nice little sum; and the consumers have, at the same time, not been forgotten, as those using prepayment meters are to enjoy a reduction in the price of gas. In spite of dearer coal, the expenditure on the manufacture of gas was less at Heywood than in the preceding year, owing to improved working results with the new plant; the new installation of vertical retorts having now been in operation for twelve months. With a smaller quantity of coal carbonized, a substantially larger amount of gas was made. In fact, had the prices of coal and residuals remained the same as in 1912-13, it is calculated that the net profit would have been about five times as much as is actually the case. The ratepayers at Lancaster benefit by a useful contribution from the Gas Department, while the consumers have had the advantage of a reduction in price. There was a large addition to the cost of coal; and another substantial item is the cost of new mains, services, meters, and prepayment stoves, charged direct to revenue account. A feature at Lancaster is the low percentage of leakage. It is stated that at St. Helens the usual causes, in addition to a reduction in the charges for gas, have affected the surplus profit to the extent of some £3000. This is an excellent result, when it is borne in mind that it is estimated that the difference in the price of gas is upwards of £3000, and in the cost of coal and returns from residuals between £3000 and £4000. It seems to be generally recognized in St. Helens that the vertical retorts have done much for the undertaking; and that the Gas Committee are of this opinion is evident from the fact that the Corporation have just applied to the Local Government Board for sanction to the borrowing of a sum of money for the provision of a further installation of the same type of verticals. Gas, we are told, is now laid on to practically every cottage in the town for lighting and cooking, and in many houses for heating purposes as well.

There is just to hand from the Paris publishing firm of MM. Ch. Béranger a work in three volumes entitled "Le Gaz," by M. René Masse, former pupil of the Polytechnique School, and Civil Engineer of Mines. It is impossible to give anything like an indication of the contents of this elaborate work within the compass of a few lines; but we shall take an early opportunity of exhaustively reviewing the volumes.

DEATH OF MR. THOMAS NEWBIGGING, D.SC., M.INST.C.E.

WITH a deep feeling of sorrow—in no way lessened by the fact that the loss was not entirely unexpected—we have to chronicle the death yesterday (Whit Monday) at his residence, Woodgarth, Knutsford, in his 81st year, of Mr. Thomas Newbigging, D.Sc., M.Inst.C.E., whose name has for many years past been a household word in the gas industry. The news coming to hand, as it does, just as we are going to press, renders impossible in the present issue more than a hurried sketch of Mr. Newbigging's eventful career—distinguished in other directions besides that of gas engineering. For the information of mourning friends, it may be stated that the burial service will take place at the Manchester Crematorium at 11.30 a.m. on Thursday. We are asked to intimate that no formal invitations to the funeral will be issued, but that the family will be glad to see any friends present. It is requested that no flowers be sent.

EARLY CAREER.

Mr. Newbigging was born in Glasgow on Sept. 30, 1833. He was the son of Mr. John Gibson Newbigging. He received his early education at Bridgeton Public School, and subsequently at the Girthon School, Gatehouse-of-Fleet. In 1844 he went to Blackburn, where he resided till 1849. Thence he removed to Bury, and served as a mechanic in the large machine shops of Messrs. Walker and Hacking. In 1851 he went to Newchurch in Rossendale, where he was appointed Secretary and Manager of the Rossendale Union Gas Company—a position he held for thirteen years. During this time he was largely instrumental in bringing the Company out of its unsatisfactory condition, and making it one of the most successful and profitable gas undertakings in Lancashire. He subsequently removed to Bacup, and identified himself with the educational institutions in the town; becoming Hon. Secretary and Director of the Mechanics' Institution. In the autumn of 1893 a suggestion was put forward that the freedom of the borough should be conferred upon him for the many distinguished services he had rendered to the district.

PROFESSIONAL WORK.

In 1870 he obtained the appointment of Engineer and Manager of the gas-works belonging to Messrs. Fielden Bros. at Pernambuco. He remained there five years, and during his stay was created by the Emperor of Brazil a Knight of the Order of the Rose. On returning to England in 1875, he commenced practice in Manchester as a Civil and Consulting Engineer. In this business his son William afterwards became associated with him. He was one of the leading authorities on gas engineering, and till within the past few years was to be seen in the Committee-rooms at Westminster giving evidence as a professional witness. The measures upon which he was engaged are too numerous to be specified. He also acted as arbitrator and valuer, appeared occasionally in legal cases, and reported on the condition of works. He succeeded in establishing an important consulting and constructional business.

It was by no means in respect of gas undertakings within the confines of the United Kingdom that Mr. Newbigging's assistance was sought. Towards the close of 1888, he visited South Africa, under an engagement with the London Agents for the Cape Town Corporation, to inspect the native coal and test it, with the view of ascertaining its suitability or otherwise for gas-making purposes; to report as to the desirability of erecting gas-works for the supply of Johannesburg; and to determine the size of the works, estimate their cost, and select a suitable site for them. He returned to England early the next year, having been successful in discovering in the Transvaal various beds of good bituminous coal well adapted for making gas. The outcome of his visit was the granting of a concession, and the formation of a company to supply gas to Johannesburg. Mr. Newbigging was appointed Consulting Engineer, and he designed the works, and the late Mr. William Carr went out to superintend their construction. So rapid was the progress made, that by the end of 1889 all the machinery and plant had either been landed in South Africa or was upon the sea. The works were completed, and some of the principal streets were lighted by gas for the first time on June 20, 1892. In the summer of 1909, he went to Canada, at the request of the Directors of the Toronto Gas Company, to advise them on important extensions of their works. He returned to England in September delighted with his trip and enthusiastic in praise of Canada.

A FOUNDER OF THE BRITISH ASSOCIATION OF GAS MANAGERS.

While at Bacup, in 1863, he took part in the movement which resulted in the formation of the British Association of Gas Managers, and was one of its first members. His connection with the organization was never severed. He passed into the Gas Institute in 1882, was President in 1884-5—the annual meeting in the latter year being in Manchester—and was for many years a Trustee. He was offered the Birmingham Medal in 1889; but in the then disturbed condition of the Institute, which led to a number of secessions from its ranks and the formation of the first Institution, he felt that its acceptance would not give him any gratification. It was awarded to him, however, in 1890. On the amalgamation of the Institute and the Institution in 1902, Mr. Newbigging continued his membership; and on the occasion of the jubilee of the organization in 1913, he, as the only surviving founder, was presented with his portrait in oils. The occasion and the short speech in which the gift was acknowledged will not be forgotten by those who were present. He said he accepted the portrait as one of the greatest honours that had fallen upon him in the course of his long life; and he thanked the donors sincerely for the kindly feeling which had prompted them to make the presentation. He handed to the Hon. Secretary a cheque for fifty guineas as a donation to the Benevolent Fund (of which he was the oldest Trustee), to signify his appreciation of the honour conferred upon him in the matter of the portrait. He was a fairly regular attendant at the meetings; but he was absent in 1909, when he was fulfilling a professional engagement in Toronto.

During his membership of the three organizations, Mr. Newbigging submitted papers on the following subjects:

1865.—Books of a Gas Company, usually Designated the Gas Registers.
1880.—Testing Coal.
1892.—Difficulties in Tank Construction.
1894.—Illuminating Power and Effect.

CONNECTION WITH THE MANCHESTER DISTRICT INSTITUTION.

Mr. Newbigging was one of the original members of the Manchester District Institution of Gas Engineers, and was for many years the Hon. Treasurer. On his re-election for the year 1912, the members, in his absence, passed a vote of thanks to him. He then expressed in writing his willingness to retire in favour of some one younger; but he added that though he was seventy-nine years of age he kept himself abreast of the doings of the Institution and of kindred associations, as well as of all modern problems in the gas industry. He was President in 1879, and delivered a very interesting and instructive Inaugural Address at the meeting on the 22nd of February. The electric light had recently made its appearance in London, and had caused a scare. Referring to the matter, Mr. Newbigging said:

> When the power of storing and gradually distributing the electric fluid from such surplus store is proved to be possible, gas shareholders may begin to have some fear for the value of their investments; but until then they may rest in tranquil possession of their property, in so far, at least, as electricity is concerned. I am content to rest the case of electricity *versus* gas there.

He delivered a second address at the meeting in November.

Mr. Newbigging's contributions to the "Transactions" of the Manchester Institution were, as shown by the following list, more numerous than to the parent body. They were:

1881.—The Capital Employed in Gas-Works as Compared with Gas Production and Gas Rental.
1886.—Water in Some of its Physical and Chemical Aspects.
1888.—Gasholders without Upper Guide-Framing.
Effects of the Presence of Water or Moisture in Coal.
1889.—Utility of Water in the Manufacture of Gas.
1890.—Lime Burning.
1891.—Differential Rates.
1892.—Management.
1896.—Illuminating Power as Exhibited in the Parliamentary Returns.
1899.—Disputed Points in Gas and Water Works Legislation.
1905.—Price of Coal Gas to Possible Users of Suction Gas and Others.
1908.—Incandescent Gas Lighting.

TECHNICAL AND OTHER LITERATURE.

Apart from his contributions to the proceedings of the Institutions above referred to, Mr. Newbigging made two valuable additions to the literature of gas manufacture. Early in the year 1870, he published the first edition of his well-known "Handbook." Though it contained certain blemishes inseparable from such a work, it was referred to in the "JOURNAL" as "an extremely useful compilation." A second edition, of smaller size, was published in 1873, while the author was at Pernambuco. This size was retained for the third and fourth editions (1883 and 1885). For the fifth edition, which appeared towards the close of 1889, a quarto form was adopted; and this was continued for the subsequent editions, which were published in 1898 (the Centenary Edition), 1904, and 1913. The writer of the review of the latest edition said there was no doubt whatever that the "Handbook" had been, and would continue to be, "an educational asset of great value to the gas industry."

Another work, in the production of which Mr. Newbigging had a very large share, was "King's Treatise on Coal Gas." It appeared originally as a series of articles in the "JOURNAL;" and these were eventually reprinted and published in three large volumes—the first in 1878, the second a year later, and the last in 1882. In editing this work, he had the co-operation of the late Mr. W. T. Fewtrell.

In connection with the jubilee year of Queen Victoria, Mr. Newbigging published, in the autumn of 1886, a book entitled "Devices for Gas Illuminations." Another work from his pen was the

"Rating of Gas Undertakings," the first edition of which, reprinted from the "JOURNAL," appeared in 1891, and the second, in which his son collaborated with him, in 1899. Two years later he produced "A Hundred Years of Gas Enterprise."

Gas matters, however, did not by any means absorb Mr. Newbigging's attention. He had a far wider outlook; and literature was his recreation. His papers submitted to the Manchester Literary Society, and the books he published from time to time, have been noticed in the "JOURNAL." He was the author of the "History of the Forest of Rossendale," "Essays at Eventide," "Fables and Fabulists," "The Scottish Jacobites," "Lancashire Humour," "Love's Cradle: The Age of the Troubadours," "Sketches in Prose and Verse," "A Nook in Galloway," "Literary By-Paths and Vagaries," "The Canadian Boat Song," and other papers, and "Old Gamul," a lyric play. Quite recently we received from him a reprint in pamphlet form of an article on William Cobbett, which he contributed to the "Manchester Quarterly" for January, 1914. He wrote a sketch of the Life of James Leach, the Manchester hymn-time writer, and it follows the Editor's preface to the collection published under the title of "Psalmody." He contributed to the "Manchester Magazine" an article on Dr. Walter Chalmers Smith, the Preacher Poet. He became "Father" of the Manchester Literary Club; and the event was celebrated by a dinner at the Grand Hotel. Mr. George Milner, who presided on the occasion, remarked that though Mr. Newbigging was not a professional author he pursued literature ardently in the intervals of an exacting profession—loving it for its own sake, and seeking no reward but the pleasure it gave him. In his reply, Mr. Newbigging said the pursuit of literature was both a solace and a delight.

A CANDIDATE FOR PARLIAMENT.

Mr. Newbigging once endeavoured to enter Parliament. On the occasion of the General Election in 1886, he contested the Rossendale Division of Lancashire with the Marquis of Hartington. There was at the time disaffection among the Liberals on the question of Mr. Gladstone's Irish policy; and Mr. Newbigging came forward at the earnest call of the supporters of that policy. Lord Hartington acknowledged that he rejoiced to think he had in Mr. Newbigging "an honourable, a courteous, and a fair opponent—one who would not stoop to any unworthy methods of warfare, one whom it would be a pleasure to meet in fair argument, one whom he hoped to treat throughout the contest with perfect respect and courtesy, and from whom he should expect the same treatment himself." Mr. Newbigging was unsuccessful; Lord Hartington being returned by a majority of 1450 votes. His election expenses, however, were paid.

PROFESSIONAL DISTINCTIONS.

Mr. Newbigging was admitted into the Institution of Civil Engineers as an associate member in 1870, and was transferred to the class of member eight years later. In view of the fact that the year 1912 was regarded as the centenary of the gas supply industry in the United Kingdom, the Senate of the University of Leeds determined to confer an honorary degree on two representative men connected with Metropolitan gas undertakings and a distinguished gas engineer in the Provinces. Mr. Newbigging was selected as most suitably fulfilling the last-named condition—Mr. Corbet Woodall and Mr. Charles Carpenter being chosen to represent the Metropolis; and the degree of Doctor of Science was conferred by the Chancellor (his Grace the Duke of Devonshire) at a congregation of the University held early in October. In presenting the above-named gentlemen, Professor Cobb, the Livesey Professor of Coal Gas and Fuel Industries, referred to the first-named gentleman in the following terms:

> Mr. Thomas Newbigging is a veteran and veteran leader who receives the willing homage of the whole gas engineering profession, and whom the University of Leeds would like to honour as it may. He has long inspired a high degree of intellectual appreciation which has ripened with the lapse of years into a more personal veneration and regard. By that careful sifting of innumerable experiences which Science has learnt to value in any field, he has brought order and principle into gas engineering practice, and made his name the recognized symbol of sound and systematic work for every gas engineer. Such complete mastery of minute detail and firm grasp of underlying principles have, in his case, been happily combined with the power of exposition, and a sure instinct in the choice of word and phrase.

On the occasion of the gas exhibition held in Manchester in the autumn of 1907, Mr. Newbigging was elected Chairman of the Advisory Committee; the Joint Hon. Secretaries being Mr. H. Kendrick, Mr. Walter Whatmough, representing the Manchester District Institution of Gas Engineers, and the Chairman of the Gas Committee of the Manchester Corporation (Alderman Gibson). The arrangements were ably carried out by the Superintendent of the Gas Department (Mr. Charles Nickson) and the Engineer-in-Chief (Mr. J. G. Newbigging), with the co-operation of the Society of British Gas Industries. Mr. Newbigging presided at the inaugural banquet, and in an excellent speech he responded to the toast of "Success to the Gas Industry." The exhibition was visited by the members of the Midland Association and also by the English Junior Gas Associations. Mr. Newbigging offered the Juniors a cordial welcome in the name of the Advisory Committee, and, addressing them as "fellow-students," offered a few exceedingly appropriate remarks. He pointed out that the rising aspirants, especially the younger ones, to the position of gas engineers and managers were especially looked to for maintaining the better traditions of the important industry in which they were engaged. The exhibition, with the accompanying series of lectures, was carried through with enthusiasm; and at its close it was generally acknowledged to have been a very great success. Mr. Newbigging took great interest in the work of the Junior Gas Associations. In addition to the address at the joint meeting already referred to, he delivered one to the Yorkshire Junior Association at their meeting on Oct. 27, 1906, on "The Value of Study and Research."

Reference has just been made to the Society of British Gas Industries. It will therefore be convenient to record here that Mr. Newbigging was elected President for the year 1909, and delivered a very interesting and characteristic Inaugural Address at the annual meeting in February. We remarked at the time that though "this veteran labourer in the gas industry" had abandoned part of his professional work, his acceptance of the presidency of the Society showed that his interest in all that was passing in the gas industry was as acute as ever. In the report presented by the Central Council at the annual meeting in 1910 (at which Mr. Newbigging was unable to be present on account of weakness resulting from illness), they expressed their indebtedness to the retiring President, who they said had taken the greatest interest in the welfare of the Society; and they tendered him their very best thanks "for his valuable services and for his encouraging address." They were gratified that he had accepted a Vice-Presidency; and they hoped to have the benefit of his experience and advice in the future.

Early in 1888, the late Mr. Robert Morton, who was then the Examiner in "Gas Manufacture" for the City and Guilds of London Institute, expressed to the Organizing Director a wish to have other gentlemen who were qualified for the duties by their position in the gas profession associated with him in the work; and Mr. Newbigging and Mr. Charles Hunt consented to act as co-Examiners with Mr. Morton. A year or two later, however, Mr. Hunt was the sole Examiner.

MR. NEWBIGGING'S FAMILY.

In 1859, Mr. Newbigging married Miss Lomax, the youngest daughter of Mr. Abraham Lomax, of Rossendale, and he had three sons and two daughters. Mrs. Newbigging died in 1902. One of his sons (Mr. John Gibson Newbigging) is the Chief Gas Engineer of the Manchester Corporation; another, as already mentioned, has long been associated with his father in his professional work; and the youngest (Mr. Ernest Lomax Newbigging) died in November, 1904, from the effects of a cycling accident.

OBITUARY.

The Dover Gas Company have lost another of their Directors in the person of Mr. T. W. FRY.

The death has occurred at a ripe old age of Sir JOSEPH W. SWAN, to whom it has been generally recognized belonged the honour of having invented the carbon filament incandescent electric lamp, as well as of perfecting its process of manufacture.

PERSONAL.

Last Sunday week, the 24th ult. (Empire Day), Mr. ALFRED LASS, formerly head of the well-known firm of Gas Accountants, and Secretary of the Barnet District Gas and Water Company, celebrated his eightieth birthday. Mr. Lass is now residing at Sandown Lodge, Putney.

Councillor Rimmer, the Chairman of the Bolton Water Committee, presided over a gathering of about 200 employees of the Water Department, held to celebrate the completion of fifty years' service by Mr. SAMUEL CALDERBANK, one of their inspectors. The Mayor presented Mr. Calderbank with a gold watch and chain, and his wife with a diamond brooch. Presentations were also made by several bodies of workmen.

Congratulations to Mr. GEORGE R. HISLOP, the Engineer and Manager of the Paisley Corporation Gas-Works, who has entered on his jubilee year of service with the undertaking. On May 30, 1865, he was appointed; and for a month before taking up his permanent residence, he undertook the management of the Coatbridge works, as well as of those at Paisley. During the 48½ years ending on Dec. 24 last, he had never missed a single Committee or other Council meeting relating to his department; and he was never late. On this date, he was injured in a motor-car accident; but, while he has not quite got rid of the effects of it, he is now enjoying fairly good health, and puts in a long business day. He looks, says a local contemporary, younger than his years would suggest; and his many friends will hope to see him as robust as ever when he has completed his half-century in the Corporation service. When he came from Coatbridge to Paisley, it was to take up his fifth position as a gas engineer and manager.

Upon the occasion of his retirement, after being in the service of the Liverpool Corporation just over half-a-century, the members of the Water Committee presented Mr. JOSEPH PARRY, M.Inst.C.E., the Water Engineer, with a handsome solid silver rose-bowl, as a token of the esteem and respect in which he is held by all the members. The presentation was made by the

Chairman (Colonel R. S. Porter), who traced the progress of the undertaking since 1863, at which time Mr. Parry joined the staff of the Water Department, when Mr. Thomas Duncan was Engineer. Mr. Parry subsequently became Assistant Water Engineer; and on the commencement of the Vyrnwy scheme in 1881, he was appointed Engineer of the Rivington works—then the city's principal source of supply. In 1890, he was appointed Water Engineer, becoming Engineer-in-Chief of the whole undertaking on the completion of the Vyrnwy works in 1892. During his term of office, the second instalment of the Vyrnwy supply has been carried out, involving the laying of over 60 miles of large iron and steel pipes, the construction of filter-beds at Oswestry, and balancing reservoirs at several points. A large reservoir, having an area of 27 acres, and a capacity of 122 million gallons, was constructed at Prescot; while the neighbouring borough of Wallasey has been supplied with Vyrnwy water by a main thirty miles in length. Other notable developments include the acquisition of the whole of the Rivington catchment area by purchase, the diversion of the Rivers Conwy and Marchnant, and the construction of tunnels for conveying the waters of the tributaries into Lake Vyrnwy. In his reply, Mr. Parry said the probability was they would have no very serious undertaking to start before they had to contemplate the laying of the third pipe line, which, he was afraid, would not be so distant as some of them would perhaps desire. They had to economize existing resources, and postpone as long as they could the outlay of £750,000, which would be necessary in order to bring more water to Liverpool. With a considerable knowledge of water-works of Great Britain and the world generally, he could say the Liverpool undertaking stood in the forefront in every respect, and they could look forward to the future with all confidence. The Corporation are to have the benefit of Mr. Parry's services as Consulting Engineer for a further period of two years.

A NEW COMBINATION OF SULPHATE MAKERS.

At the Horseferry Road Offices of the Gas Light and Coke Company last Tuesday, a largely-attended meeting took place of makers of sulphate of ammonia. Gas-works, coke-ovens, blast-furnaces, shale-oil, collieries, and producer gas were all of them represented.

Under the exceptional circumstances prevailing at the present time, it was felt that a selling combination should be formed among makers for the following reasons:

1. Owing to the increase in the quantity of sulphate produced throughout the world compared with a few years ago.
2. In consequence of a new process in operation in Germany for making sulphate of ammonia as a primary product, so that any quantity can be produced at a cheap rate.

The British makers' export trade is consequently seriously threatened, and prices have dropped to a lower level than has been experienced since 1902—simply for fear of what might happen in the near future.

The unit value of sulphate of ammonia is very materially below that of nitrate of soda just now; and this condition of things is the reverse of what it should be.

There was at the meeting strong support given to the movement; and it is hoped that makers will join the Association, in order to protect the British export trade, and increase the consumption in the United Kingdom.

Co-Partnership in New York.

Plans are being prepared for a co-partnership scheme by the Consolidated Gas Company of New York and the Edison Company, by which it is intended that any employee so wishing may have an amount deducted from his wages with which to buy consolidated stock in the open market. This movement is in response to an impression that there is a general desire among the employees to become financially interested in the concern they serve; and it is confidently expected that the scheme will be a great success.

Gas Supply of Madrid.

According to the "Journal de l'Eclairage au Gaz," a new contract is likely to be signed between the Madrid Gas Lighting and Heating Company and the Municipality. The terms include a 23 per cent. reduction in the present price of public lighting, which would mean an annual loss to the Company of some £24,000. Besides this, the Company would have to increase the public lighting by 38 per cent., and spend 200,000 pesetas (£8000) every four years on the distribution system. The duration of the contract is fixed for 20 years; the Municipality having the right to terminate it after 12 or 15 years, but only for the purpose of municipalizing the undertaking. A curious feature of the contract is that the gas and electric mains of the Company are not to be handed over to the Municipality until after 50 years. Even after the expiration of the contract at the end of 20 years, the Company is to be bound to maintain them in good order. This is explained by the fact that stock has been issued on the security of the mains, and is not redeemable for 50 years.

COLLIERY MANAGERS AND THE GAS INDUSTRY.

At a largely attended meeting of the Scottish Branch of the National Association of Colliery Managers, held in Glasgow last Saturday, Mr. Richard M'Phee, General Manager for Messrs. Wm. Baird and Co., of Bothwell, N.B., delivered an interesting presidential address on "Coal Mining and its Relation to Other Industries."

In the course of it, he said that the importance of gas manufacture as a fuel consuming and fuel producing industry could be gauged by the fact that almost one-tenth of the coal consumed in the United Kingdom found its way into the retorts of the gas-works scattered all over the country. Undoubtedly, the gas industry had made great strides since William Murdoch lit up the works of Messrs. Boulton and Watt at Soho by means of coal gas in 1803. The most important part of a gas undertaking was the carbonization plant, as it constitutes the mainspring of the subject of gas manufacture; but which was the best carbonizing system to adopt was a question not so easily answered. Horizontal retorts fully charged, intermittent and continuous systems of vertical retorts, and chamber-ovens all had their advocates—and rightly so; for what might with advantage be adopted at one place might be totally unsuited to another. The changes in the methods of carbonization which had taken place from time to time, and more particularly during more recent years, had had a marked influence upon the quantity and quality of gas, and also upon bye-products obtained per ton of coal. On the introduction of the incandescent mantle, the demand for gas of high illuminating power was no longer justified. Indeed, the fact that the light emitted by the incandescent mantle depended solely on the calorific value of the gas, had served to lessen considerably the importance attached to the illuminating power. This difference in requirements was largely responsible for the changes in methods of carbonization. The temperature of retorts had been steadily increased, as by this means the yield of gas was largely augmented, without any unduly impairing of its heating properties. Ten years ago, 9000 cubic feet of gas per ton of coal was quite a creditable result; to-day a yield of 12,000 cubic feet per ton was nothing extraordinary. The progress of the gas industry since Murdoch's time had been one long unbroken record of success. In the interval it had served the public efficiently, and had played no small part in contributing to the welfare and comfort of the community.

The most important and valuable bye-product from coke-ovens was sulphate of ammonia; and it was interesting to note the enormous increase that had taken place in production during the last ten years. The average yield of sulphate of ammonia per ton of coal might be assumed to be: From coke-ovens, 28 lbs.; from gas-works, 24 lbs.; from blast-furnace plants (coal fed), 21 lbs. These figures merely represented the average yield, because many works showed as high as 35 lbs. of sulphate per ton of coal. The yield of sulphate depended on the percentage of nitrogen found in the coal, and the temperature of distillation. There was no doubt that the growing appreciation of, and the demand for, sulphate of ammonia as a fertilizer has enabled its price to be maintained even in the face of a growing output. Of the comparative value of sulphate of ammonia there were abundant proofs. Primarily, it was a manure, valuable for its nitrogen; and it was distinct from general classes of manure which supplied all the necessary plant foods.

Tar, another of the bye-products, was an exceedingly complex mixture, and varied in composition, not only because of the different grades of coal from which it was obtained, but also because of the various conditions under which it was produced. Industrial tars recovered from coal distillation were usually classed as: Gas-tars (various kinds); coke-oven tar; blast-furnace tar (practically confined to the West of Scotland, where splint coal was used for the reduction of iron ores); and producer tar. The yields per ton of coal averaged about 10 gallons of gas tar, from 6 to 7 gallons of coke-oven tar, and from 12 to 14 gallons of blast-furnace tar.

The subjoined table of the production of tar in Great Britain was taken by the author from Dr. Gray's paper on "Oil Fuels and their Application."

	Tons.
Coal-gas tar	785,000
Coke-oven tar	300,000
Blast-furnace tar	145,000
Producer tar	25,000
Total	1,255,000

As to benzol, Mr. M'Phee said it was principally derived from coke-oven gas—a small quantity also being obtained from the first runnings in the distillation of coal tar. The yield of crude benzol per ton of coal was a variable figure; but 2½ gallons was about the average. The crude benzol was then re-distilled and chemically treated, and after further distillation yielded about 1¾ gallons of motor spirit per ton of coal.

In the supply of power, it was added, coal gas had also taken a prominent part. Gaseous fuel had undoubtedly much to recommend it; and now that the means of utilizing it were so efficient and so reliable, one might naturally expect to see a rapid development in its use.

INSTITUTION OF GAS ENGINEERS.

Programme of Meeting and Report of Council.

THE programme of the forthcoming Annual General Meeting of the Institution of Gas Engineers, to be held in Liverpool from the 16th to the 18th inst., under the presidency of Mr. Edward Allen, M.Inst.C.E., Engineer to the Liverpool United Gaslight Company, has been issued by the Secretary (Mr. Walter T. Dunn); and we have also received a copy of the annual report of the Council.

The business meetings will be held in St. George's Hall, Liverpool; and the proceedings on the opening day will consist of a welcome by the Lord Mayor of Liverpool (the Right Hon. Herbert R. Rathbone, J.P.) and the Chairman of the Liverpool Gas Company (Mr. H. Wade Deacon, J.P.), the submission of the minutes of the last meeting for confirmation, the appointment of Scrutineers to examine the ballot-papers for the election of officers, members of the Council, and ordinary and associate members. The presentation of medals awarded for papers read last year will be followed by the President's Address, the presentation of the annual report and accounts, and the reports of the Refractory Materials Committee, the Ventilation Research Committee, and the Institution Gas Research Fellows. In the evening there will be a reception and dance at the Adelphi Hotel, by invitation of the Chairman and Directors of the Liverpool Gas Company.

On Wednesday morning, after the meeting of the Benevolent Fund, Mr. Charles Carpenter, D.Sc., will deliver his lecture; and this will be followed by the reading of one of the papers, a list of which was given in the "JOURNAL" for April 28 [p. 235]. In the evening there will be a reception and dance at the Town Hall, by invitation of the Lord Mayor of Liverpool and the Lady Mayoress.

Thursday morning will be devoted to the consideration of the remaining papers, and the presentation of the Scrutineers' report; and in the afternoon, by invitation of the President, there will be a sail on the Mersey.

Friday will be devoted to an excursion to Chester and Eaton Hall. At any time during the week of the meeting, members, by the courtesy of the Chairman and Directors, may visit any of the works or show-rooms of the Liverpool Gas Company.

EXTRACTS FROM THE ANNUAL REPORT OF THE COUNCIL.

MEMBERSHIP.

At the close of the year 1913 there were 875 names on the register, compared with 862 for the year before—an increase of 13. The additions consisted of one honorary member, thirty members, twelve associate members, one associate, and two students. Comparative figures for the two years relating to the various classes are given:—

Class of Member.	At Dec. 31, 1912.	Elected or Transferred during 1913.	Deceases, Resignations, Transferences, &c., during 1913.	At Dec. 31, 1913.	Increases and Decreases.
Honorary members.	23	1	..	24	+ 1
Members	718	40*	24	734	+16
Associate members.	114	12	14	112	− 2
Associates . . .	2	1	1	2	..
Students	5	2	4	3	− 2
Total . . .	862	56	43	875	13

* 10 transferred

The Council regret that the deceases of the following members have to be recorded:—

Alexander Allan	Scarborough.
Charles Edward Botley	Hastings.
Joseph Braithwaite	Wrexham.
Thomas Cross	Cannock.
William Jerrett Dougall	Sevenoaks.
William Henry Green	Bournemouth.
Charles William Grimwood	Sudbury.
Walter W. Hutchinson	Barnsley.
Edward Jones	Longport.
Robert S. Keys	London.
Charles Meiklejohn	Rugby.
Samuel S. Mellor	Northwich.
Edmund Daniel Sapey	Horsham.
Sophus Simmelkjoer	London.
Richard H. Townsley	Leeds.

ANNUAL GENERAL MEETING.

The fiftieth annual general meeting took place from the 17th to the 20th of June, under the presidency of Sir Corbet Woodall. Being the occasion of the celebration of the Jubilee of the Institution, the gathering was characterized by several special features. A number of delegates attended from kindred societies in Great Britain, the Colonies, and abroad to offer their congratulations. Mr. Thomas Newbigging, D.Sc., the last survivor of those who took part in the preliminary meeting of the British Association of Gas Managers in 1863, was the recipient of his portrait in oils by Mr. Tom Mostyn. The Birmingham Medal was presented to Sir Corbet Woodall in recognition of his services to the industry. A banquet took place, which a number of distinguished guests honoured by their presence; and a garden party was given by the President and Lady Woodall at their home at Chislehurst.

After giving a list of the communications considered at the meeting after the delivery of the President's address, it is said that the Council have made the following awards for papers read last year: The London Gold Medal to Dr. W. B. Davidson, for his paper on "Liquid Purification;" the Institution Gold Medal to Mr. W. Chaney for his paper on "Coke-Oven Carbonization;" the Silver Medal for Dr. Davidson's paper as above; and the Bronze Medal to Mr. F. W. Goodenough, for his paper on "Creating an Outdoor Staff."

EXAMINATIONS IN "GAS ENGINEERING" AND "GAS SUPPLY."

With reference to the City and Guilds of London Institute Examinations in "Gas Engineering," Mr. Thomas Glover, the Examiner, reports that, at the examinations which were held on April 25, 295 candidates presented themselves, of whom 125 sat for the Final Paper, and 170 for Grade I., as compared with 277 for the previous year, consisting of 104 in the Final and 173 in Grade I. The Examiner in the subject of "Gas Supply," Mr. Walter Hole, reports that 671 candidates presented themselves at the examinations held on May 2—225 in the Final and 446 in Grade I. In the examinations of the year before the number of candidates was 538—made up of 141 in the Final and 397 in Grade I.

Mr. Thomas Glover, having completed the usual term of five years as Examiner, and not desiring to be re-appointed for a further period, requested the Council to consider the nomination of a successor. A cordial vote of thanks was passed to Mr. Glover, expressing the appreciation by the Institution of the valuable services he has rendered the industry during his tenure of the examinership. Mr. Samuel Glover, of St. Helens, consenting to be nominated to the vacant position, has been duly appointed Examiner by the Examinations Board of the City and Guilds of London Institute.

EDUCATION AND CERTIFICATION OF GAS-FITTERS.

Following on the decisions at last year's meeting of the Institution, further negotiations have taken place with the Department of Technology of the City and Guilds of London Institute, with the result that the subject of "Gas-Fitting" has been introduced into its programme. The first examinations are to take place in 1915. The course is intended to cover a period of at least three years—divided respectively into Grade I., Grade II., and Final, with practical tests included in the two latter. The Council were asked by the Institute Examinations Board to nominate two Co-Examiners; and they selected the names of Mr. H. Kendrick, of Stretford, and Mr. Ralph Halkett, of Glasgow, who have consented to serve. Their appointment has been approved by the Board.

At the request of the Council, the District Associations affiliated with the Institution have appointed Examinations Committees to co-operate with the local technical schools and trade representatives with a view to the formation of classes commencing in September next; also to recommend examiners for the practical tests, and to help forward the scheme in every possible way.

[The names of the Committees for the various districts are set out; and it is added that they will hold a Joint Conference at Liverpool on Wednesday, the 17th inst.]

CARBONIZATION COMMITTEE.

The Carbonization Committee, consisting of the President, Vice-Presidents, and Honorary Secretary (*ex officio*), and Messrs. J. Ferguson Bell (Honorary Secretary to the Committee), A. E. Broadberry, Charles Carpenter (Chairman), C. Dru Drury, T. H. Duxbury, Thomas Glover, D. H. Helps, W. R. Herring, William Langford, J. W. Morrison, and E. W. Smith, have, after careful consideration, unanimously decided to recommend that the Committee should not be re-appointed. They have arrived at this decision by reason of their continued failure to arrange comparative testings of various systems of carbonizing plant under conditions which would make comparison useful, and because they believe the difficulties which have presented themselves are not likely to be readily overcome.

In view of this decision, it will be desirable to recall the circumstances which led to the appointment of the Committee, and to summarize the work accomplished under their direction, together with references to various communications on the subject of carbonization which have been laid before the Institution during the period of the Committee's existence.

In 1905 a report on the proposed establishment of an Investigation Fund was prepared by Mr. J. W. Helps, and presented to the Institution at the meeting that year. This showed that the proposal had its origination in a letter dated Dec. 15, 1904, from

Mr. Charles Carpenter to the Institution, in which he suggested that an investigation should be conducted on the influence on health of lighting and warming by means of gas, but especially the former, as it not infrequently came before the supplier of gas in the form of bad and unjustifiable testimonials from medical men. Mr. Carpenter made the suggestion that a Scientific and Medical Committee, working in conjunction with the Institution, should be appointed to make a thorough examination of the whole matter.

The Special Committee to whom the letter was referred by the Council, while fully appreciating the importance of the suggested investigation, the result of which they believed would prove the truth of Mr. Carpenter's contention, expressed the opinion that it would be useless to recommend the Council to take the necessary steps in the direction indicated, inasmuch as the funds at the disposal of the Institution would prove totally insufficient to meet the expense that would have to be incurred.

The result of the report by Mr. Helps was the establishment of a Special Purposes Fund, to which all undertakings in the United Kingdom were invited to subscribe on the basis of 6d. per million cubic feet of gas made per annum.

A copy of the circular issued in this connection will be found in the Council's report for the year 1906. In the list of subjects mentioned as indicating the character of the work proposed to be done, reference is made to "improvements in the methods of manufacture."

In the following year, 1907, the Council reported that the sum of £566 17s. 9d. had been received from 145 undertakings; and that a Special Purposes Committee had been appointed, from which a Sub-Committee on "Carbonization" and another on "Gas for Heating Purposes" had been elected.

This first Sub-Committee on "Carbonization" was composed of Messrs. A. E. Broadberry, Charles Carpenter, Thomas Glover, and S. Y. Shoubridge as Honorary Secretary. A circular was issued to the members of the Institution asking for any instances of exceptional results worthy of consideration which had come under their notice, and inviting co-operation in obtaining information which might be of value to the gas industry. The Sub-Committee, with the information furnished by the replies received, commenced their work, and in the year 1908 reported that they had so far directed their attention to ascertaining the conditions in gas-works where the highest yields of gas per ton of coal had been obtained. They visited several works, and carefully examined the plant and noted the results obtained from it, the quality of the coal used, and any special circumstances likely to influence the working. They also reported that, in view of the great development of the vertical retort system which had taken place on the Continent, they had requested Dr. H. G. Colman, in conjunction with Mr. A. E. Broadberry, to make, on behalf of the Committee, a series of tests at Dessau, and at other works in Germany. The results of these tests are contained in the report published in the "Transactions" for 1908. To it, by courtesy of the German Society of Gas and Water Engineers, was added a report on the investigation as to the efficiency of vertical retorts at the gas-works in Berlin (Mariendorf) and Zurich (Schlieren) conducted by the Research Department of that Society.

In 1909 the Sub-Committee reported that, having regard to the great developments which were taking place in the use of vertical retorts and in carbonizing in chamber settings, they felt it would be impossible to submit any conclusive statement at that time.

They stated that the outstanding developments in this country included the commencement of an installation of Dessau vertical retorts at Sunderland, and one of the Woodall-Duckham vertical retorts on the continuous system at Burnley; also the starting of the Young and Glover vertical retorts at St. Helens. They likewise referred to the increasing use of heavier charges and longer periods in the working of horizontal retorts. The improvements claimed for this method of working were set out in a paper on "Carbonizing," which was presented to the meeting in 1909 by Mr. J. Ferguson Bell.

At the same meeting a report prepared by Dr. R. Lessing at the request of the Committee was presented, showing the progress which had been made in carbonizing processes in this and other countries during the previous twelve months. This indicated the enormous development of the vertical retort and the carbonizing chamber systems on the Continent.

The Sub-Committee for 1909-10 was enlarged by the addition of Messrs. Edward Allen, J. Ferguson Bell, William Langford, John W. Morrison, and Alexander Wilson. In their report published in 1910 disappointment was expressed that they had not been able to arrange for a comparative test of the three best-known systems of vertical retorts. Mr. Bell furnished details of an investigation into the working of horizontal retorts with full charges, which was presented in the form of a paper, and discussed at the meeting in 1910. In that year the Sub-Committee was constituted a Committee, and had added to it Messrs. T. H. Duxbury, W. R. Herring, and Lawrence Hislop.

The Committee in their report of 1911 stated that, in view of the trials which were being made in this country of the various systems of vertical retorts, and also the fact that several papers describing the results of the experience obtained with them to that time were to be presented at the annual meeting of the Institution by the engineers of the various works where the systems were in use, they considered it advisable to defer their endeavours to arrange comparative tests until the initial difficulties inseparable from new installations had been overcome.

The papers referred to were read and discussed at Glasgow, and were entitled: "The Dessau Vertical Retorts at Sunderland," by Mr. Charles Dru Drury; "The Woodall-Duckham System of Vertical Retorts," by Mr. J. P. Leather, of Burnley; and "The Scientific Carbonization of Coal," by Mr. J. G. Newbigging, of Manchester. At this meeting also Mr. Alexander Wilson, in his Presidential Address, described a system of "continuous intermittent" vertical retorts which he had designed and successfully tried at Glasgow—continuous as far as the production of gas was concerned and intermittent as regards drawing and charging.

The Committee further reported that they had watched the progress which had been made in the development on the Continent of vertical retorts and carbonizing chambers, and had the figures given in their last report relating to it in 1909 brought up to date. These later figures were given in a communication by Dr. Lessing, in which reference was made to the testing of gas coals, horizontal retorts, inclined retorts, intermittent vertical retorts, continuous vertical retorts, chamber settings, coke-oven gas for town supply, mechanical producer, and comparison of various carbonizing systems.

The Committee added that no invention of striking novelty in connection with carbonization had been introduced during the previous year; that there had been a considerable extension of the system of using heavier charges and longer periods of carbonization; but, on the other hand, that some engineers who had tried the method had reverted to lighter and shorter charges; that it was probable that no particular design of plant or system of working would give the best results from all classes of coal; and that local conditions must govern the determination as to the best course to adopt in each instance.

In 1912, and again in the following year, the Committee reported that their attempts to arrange comparative tests of vertical carbonizing systems had again proved abortive; and the same statement summarizes their report as to comparative trials during the past year.

It seems evident that it must be for each individual engineer to satisfy himself as to how far any particular system of carbonizing would suit his own case, not only as regards the character of the coal he has to use, but with respect to the quality of the gas and the residuals he desires to produce. He has now so many opportunities for doing this that there seems to the Committee no justification for continuing their existence; and they therefore recommend that they be not re-appointed.

Refractory Materials Committee.

The Refractory Materials Committee—consisting of the President and Hon. Secretary (*ex officio*), and Messrs. J. Ferguson Bell, John Bond, A. E. Broadberry, F. J. Bywater (Hon. Secretary to the Committee), H. G. Colman (Chairman), J. P. Leather, W. S. Morland, W. B. Randall, S. Y. Shoubridge, Alex. Wilson, and John Young—report that during the year they have made inquiries in the United States with regard to silica retorts, the use of which was referred to at the Institution meeting last year; and through the kindness of Mr. H. Russell, of the Rochester Railway and Light Company, New York, they have been able to obtain the views of several prominent users and makers of these retorts. A synopsis of this information will be included in the Committee's annual report. Mr. Russell is Chairman of the Refractory Materials Committee of the American Gas Institute; and with his assistance the two Committees have been placed in communication with each other, and an exchange of information and reports has been arranged, which will doubtless prove mutually interesting and beneficial. During the year Dr. J. W. Mellor has been carrying out for the Committee, in collaboration with the Retort and Firebrick Section of the Society of British Gas Industries, an important investigation of the comparative effect of high temperatures on fire clays and refractory materials when under load and without load, and these results will also be published in the Committee's annual report.

Institution Gas Research Fellowship.

Mr. Harold Hartley, M.Sc., will present to the annual meeting a report of the work in connection with surface combustion which he has carried out at Leeds University during his tenure of the Institution gas research fellowship, 1909-12, under the supervision of Professor W. A. Bone, F.R.S. (late Livesey Professor of Coal Gas and Fuel Industries). The report of the work done by the present holder of the Fellowship, Mr. Harold Hollings, B.Sc., under the direction of Professor John W. Cobb, B.Sc. (Livesey Professor), will also be presented, and will consist of two communications: (*a*) "Thermal Phenomena in Carbonization," and (*b*) "Influence of Red-Hot Coke and Radiant Heat on the Gaseous Products of Carbonization," both by Mr. Hollings and Professor Cobb.

Ventilation Research.

The Joint Committee on "Ventilation Research" proposed by the Council last year has been constituted as follows: Professors Arthur Smithells (Chairman), John W. Cobb, J. B. Cohen, and Mr. S. R. Thompson representing the University of Leeds, and Messrs. John Bond, J. H. Brearley, E. W. Smith, and Charles Wood, representing the Institution. Mr William Harrison, M.Sc., has been appointed Research Chemist to the Committee. Arrangements have been made for a preliminary report on the investigations in progress to be submitted at the annual meeting.

Gas Heating Advisory Committee.

The Council recognizing the desirability, in the interests of the industry, of a standard method of testing gas-fires, and the issue of official certificates showing the results obtained by such tests, have invited the following gentlemen to act as an Advisory Committee to consider and recommend a suitable method, and the form of official certificates: The President of the Institution, the President of the Society of British Gas Industries, Professors Smithells and Cobb of the Leeds University, Professors Bone and Callendar of the Imperial College of Science and Technology, Professor Dixon of the Manchester University, Mr. John Bond, of Southport, Mr. H. James Yates, of Birmingham, Mr. H. M. Thornton, of London, and the Hon. Secretary of the Institution (*ex-officio*). Professor Bone has accepted the position of Hon. Secretary to the Committee.

Standard Specification for Street Lighting.

Mr. A. P. Trotter presented a paper before the Illuminating Engineering Society on April 15, 1913, in which was embodied generally the work done by the Joint Committee dealing with the preparation of a standard specification for street lighting. Following the debate at that and the adjourned meeting on April 27, the Committee held a meeting to discuss the various points raised. It was decided to consider the possibility of alternative clauses to meet the view of those who did not agree with the computation of street illumination in horizontal-plane foot-candles. Mr. F. W. Goodenough suggested and undertook to submit proposals using candle power determined at specified angles below the horizontal as the fundamental basis, with a statement of the average as well as the minimum illumination to be required in any contracts for street lighting. Such proposals will, in due course, be submitted and discussed. Mr. John Bond and Mr. F. J. Bywater have been added to the Joint Committee having this matter in hand, and with Mr. S. Y. Shoubridge and Mr. Robert Watson act as the Institution's representatives.

International Commission on Illumination.

A meeting was held in Berlin on Aug. 27 to 30, 1913, under the chairmanship of M. Vautier, for the consideration of a new constitution of the "International Commission on Photometry." The meeting was attended by delegates from the national gas institutions, formerly constituting that Commission, and also by delegates from national institutions of electrical engineers, and illuminating engineering societies. The Institution of Gas Engineers was represented at this meeting by Dr. Harold G. Colman and Mr. W. J. A. Butterfield. At this meeting it was decided, subject to ratification by the Societies, to dissolve the "International Commission on Photometry" and to form an "International Commission on Illumination," representative of the gas, electrical, and illuminating engineering interests of the different countries. By the constitution of this Commission, delegates are appointed to it by a National Committee in each country.

A "National Illumination Committee for Great Britain" has accordingly been formed by collaboration between the Institution of Gas Engineers, the Institution of Electrical Engineers, the Illuminating Engineering Society, and the National Physical Laboratory. The Committee has held two meetings.

The representatives of the Institution of Gas Engineers on this Committee are: Mr. Edward Allen, Mr. John Bond, Mr. W. J. A. Butterfield, Dr. H. G. Colman, and Mr. Robert Watson, of whom Mr. Allen has been chosen by the Committee as its Chairman, and Mr. Butterfield as its Honorary Secretary and Treasurer. The representatives of the Institution of Electrical Engineers are Mr. Frank Bailey, Mr. William Duddell (Vice-Chairman of the Committee), Mr. Kenelm Edgcumbe, Mr. Haydn T. Harrison, and Professor John T. Morris. Those of the Illuminating Engineering Society are: Dr. James Carr, Mr. Leon Gaster, Mr. F. W. Goodenough, Professor Silvanus P. Thompson, and Mr. A. P. Trotter (Vice-Chairman of the Committee). The National Physical Laboratory is represented by Dr. R. T. Glazebrook and Mr. C. C. Paterson.

The annual contribution of £50 for Great Britain to the "International Commission on Illumination" together with the expenses of the National Committee are met by equal contributions of £25 per annum from the Institution of Gas Engineers, the Institution of Electrical Engineers, and the Illuminating Engineering Society.

International Commission on Pipe Threads.

Mr. Alexander Wilson, the Institution's representative at the last meeting of this Commission, has presented to the Council the following report on the matter:

As requested, I attended the meeting of the International Commission on Pipe Threads in Paris on Nov. 17 and 18, 1913, along with the other British representatives—Mr. Leslie S. Robertson, Secretary of the Engineering Standards Committee, and Mr. Howard Krause. Dr. Glazebrook, C.B., the other British delegate, was unable to attend. I now beg to give the following preliminary report as kindly drafted by Mr. Robertson.

As requested by the last meeting of the Commission, the British and German delegates met prior to the assembling of the Commission and discussed the various points remitted to them.

The decisions arrived at by the Commission were briefly as follows:—

(1) *Form of Pipe End.*—A considerable discussion took place over this; and it was finally agreed that the two classes of tubes and couplers recommended by the Committee be accepted, namely:—

Class 1. The taper screw having a taper of 6 per cent. (or 1 in 32).

It was, however, further agreed that if at any time, for mechanical reasons, a finer taper than 6 per cent. was needed, a taper of 3 per cent. should be approved.

Class 2. The parallel screw.

(2) *Pitch.*—The number of threads recommended by the Committee has been adopted in all cases except for the ¼-inch and the ⅜-inch sizes, where the adoption of eighteen threads instead of nineteen was recommended. It was further agreed to state the number of threads as so many threads per 127 millimetres. This figure is exactly 5 inches (25·4 mm. × 5 = 127 mm.), and therefore the pitches are stated as five times the number of threads per inch in the British standard tables.

(3) *Gauge Diameters.*—The gauge diameters were decided upon as follows. The corresponding British standards are given in a parallel column.

Conference 1913.	British Standards.	
Mm.	Mm.	Ins.
9·8 ..	9·73 ..	·383
11·0 ..	— ..	—
13·4 ..	13·16 ..	·518
16·8 ..	16·66 ..	·656
21·0 ..	20·95 ..	·825
23·0 ..	22·91 ..	·902
26·4 ..	26·44 ..	1·041
30·2 ..	30·20 ..	1·189
33·2 ..	33·25 ..	1·309
38·0 ..	— ..	—
42·0 ..	41·91 ..	1·650
47·8 ..	47·80 ..	1·882
53·8 ..	53·75 ..	2·116
59·6 ..	59·61 ..	2·347
65·8 ..	65·71 ..	2·587
69·4 ..	— ..	—
72·6 ..	— ..	—
75·2 ..	75·18 ..	2·960
81·6 ..	81·53 ..	3·210
88·4 ..	87·88 ..	3·460
94·0 ..	93·98 ..	3·700
101·0 ..	100·33 ..	3·950
106·6 ..	106·68 ..	4·200
113·6 ..	113·03 ..	4·450

(4) *Position of Gauge Diameter.*—It was agreed that the calculations for the position of the gauge diameter due to the slight alteration in the taper should be left to a Sub-Committee.

(5) *Angle of Thread.*—America and France both gave way on the question of the 60° angle; and therefore the 55° angle was adopted unanimously.

(6) *Form of Thread.*—The 55° angle having been adopted, the Whitworth form of thread was then unanimously adopted in its entirety.

(7) *Length of Thread.*—It was agreed that length of thread on the pipe end with taper screw should be expressed as a *minimum*, and for parallel screwing as a *maximum*.

Length of thread agreed to for

⅛-inch pipe
¼ " "
⅜ " "
½ " "
¾ " "
1 " "
1¼ " "
1½ " "
2 " "
2½ " "
3 " "
3½ " "
4 " "

} was 1/16-inch less than British standard.

} was 1/16-inch more than British standard.

(8) *Standard Reference Gauges.*—It was proposed by the French delegates that, when the final details of the international pipe threads have been settled by the small Committee to whom it was referred, two sets of reference gauges should be made in England—one set to be retained in this country and one sent to France for reference purposes on the Continent. The German delegates agreed to this, but said they thought Germany would desire that a third set should be made for reference purposes in Germany. Details in regard to this matter were left for future consideration.

Further Report.

When the minutes of the Congress are available, a final and complete report will be prepared by the delegates; but it was thought that the above preliminary report would be of interest and would be sufficient in the meantime.

General Review.

There have been four meetings of the Commission in all:

First Congress, 1908.—At the first meeting at which the Standards Committee was not represented, it was practically decided to adopt the 60° angle and the Briggs thread, which would have materially injured the commercial interests of European nations and given undue advantage to one particular nation.

Second Congress, 1909.—At the second Congress, at which representatives of the Standards Committee were present for the first time, it was agreed to adopt certain recommendations of the Standards Committee such as the principle of the gauge diameter, taper, and method of measuring length of thread, but leaving the question of the position of gauge diameter for future consideration. It was also agreed to adopt many of the gauge diameters recommended by the Standards Committee; but important alterations were asked for in some of the more common commercial sizes.

The German delegates were not present at the second Congress; and at the strong pressure of the British delegates, it was agreed that no final recommendations should be come to, but that only a general expression of opinion should be registered on all points until such

time as the German and other European countries were properly represented.

Third Congress, 1910.—The position of affairs at the third Congress is fully set forth in a former report.

Fourth Congress, 1913.—At the fourth Congress the American and French delegates frankly gave way on the question of the 60° angle, and agreed to the 55° angle with the Whitworth form of thread.

The attitude adopted at the later congresses shows that the work of the British Standards Committee, as it became known to the delegates of the various countries, received their acknowledgment and support; and the fact that the recommendations of the Committee have with few exceptions been adopted as the International standards must be of considerable value to the industry of this country.

National Insurance Act, 1911 (Part II.).—Unemployment Insurance.

The Council have to report that no important decisions affecting the gas industry have been issued by the umpire since their last report. There have been many inquiries from different parts of the country regarding the application of decisions already given; and information has been supplied which has enabled matters to be arranged satisfactorily with the Board of Trade authorities. Important alterations in the Act are proposed by the Board of Trade, which the Committee having this matter in hand are considering with a view to taking action.

Parliamentary Committee.

Various important subjects have received the consideration of the Parliamentary Committee during the past year, some of which are still engaging their attention.

Canal Traffic.

The resolution passed at the last annual meeting in favour of legislation upon the report and recommendations of the Royal Commission on Canals was duly forwarded to the Prime Minister, and an acknowledgment was received. The Water-Ways Association, who are moving in this matter, report that considerable support has been gained in various directions throughout the country. The Parliamentary Committee which is being formed now numbers 117 members of Parliament. The objects of the Association are: (*a*) To induce the Government to bring in legislation to give effect to the principle contained in the recommendations of the Royal Commission on Canals (1909) by appointing a Water-Ways Board; (*b*) by the dissemination of literature and through the Press to educate public opinion to support the policy of State acquisition of our water-ways—the State acting as toll takers only, not carriers, and to recognize the necessity of this country improving its means of inland water transit, so that it may enjoy the advantages already possessed by its Continental rivals in trade. The Council have not lost sight of this matter; and it is hoped that before long further action will be taken.

Departmental Committee on the Smoke Nuisance.

The attention of the Council has been called to the appointment by the President of the Local Government Board of a Departmental Committee "to consider the present state of the law with regard to the pollution of the air by smoke and other noxious vapours and its administration, and to advise what steps are desirable and practicable with a view to diminishing the evils still arising from such pollution." Professor Cohen, of Leeds University, a member of the Joint Ventilation Research Committee previously referred to, has been appointed on this Departmental Committee. The question of offering evidence on behalf of the gas industry is receiving the consideration of the Council.

General Engineering Research Committee.

At the request of the Institution of Mechanical Engineers, the Council have appointed two representatives (Mr. Edward Allen and Mr. W. E. Price) to confer with those of other engineering institutions and societies on the question of the desirability of forming a General Engineering Research Committee as suggested by Sir H. Frederick Donaldson, K.C.B., in his Presidential Address to the Institution of Mechanical Engineers.

International Engineering Congress.

An invitation has been received by the Institution from the American Society of Civil Engineers, the American Institution of Mining Engineers, the American Society of Mechanical Engineers, the American Institution of Electrical Engineers, and the Society of Naval Architects and Marine Engineers to take part in the proceedings of the International Engineering Congress to be held at San Francisco in September, 1915. This invitation has been communicated to the members. The Council hope to be able to arrange for the Institution to be represented on this occasion.

Proposed National Gas Committee.

As requested in the resolution passed at the last annual meeting, the Council have been considering the question of the establishment of a National Gas Institute; but they are not yet in a position to make any recommendation upon it.

Arising out of the movement, they have to report that at their suggestion a Joint Committee consisting of seven delegates each from the Institution, the Society of British Gas Industries, and the British Commercial Gas Association was appointed to consider the Council's proposal that a National Gas Committee be formed as a permanent body, to consist of representatives of the three organizations named, with the object of safeguarding and promoting the interests of the gas industry whenever circumstances arise which render joint action desirable. Several meetings have been held for the discussion of the proposal. A feeling was expressed by the majority of the Joint Committee that certain difficulties presented themselves, and that the time was not yet ripe for bringing the matter to a conclusion. It was resolved that the subject be adjourned for future consideration by the Committee.

National Gas Congress and Exhibition, 1913.

Having for its object the commemoration of the jubilee of the Institution of Gas Engineers and the centenary of public gas supply, a "National Gas Congress and Exhibition" took place in the International Exhibition Halls, Shepherd's Bush, London, from Oct. 1 to Nov. 1, 1913. It was held under the auspices and control of a Committee representing the Institution, the Society of British Gas Industries, the British Commercial Gas Association, and the leading gas companies and corporation gas committees of the United Kingdom.

Sir Corbet Woodall acted as President, Mr. Edward Allen as Chairman of the General Committee, and Mr. F. W. Goodenough as Chairman of the Executive Committee.

The Council refer with satisfaction to the great success achieved in holding this congress and exhibition, and believe that its effects will prove to be of lasting benefit to the industry as a whole.

They desire to record their appreciation of the ability and untiring energy shown by Mr. Goodenough and others in connection with the inception of the undertaking, in dealing with the details of organization, and in carrying through the whole scheme to a successful issue.

Conferences of educationists, employers, manufacturers, on food and cookery, coal smoke abatement, the economics of the home, and on some aspects of scientific illumination were held; and a series of popular lectures on the use of gas in home, office, and factory were delivered.

The exhibits were arranged on co-operative lines, so that the competitive character usually apparent at exhibitions was eliminated, and opportunity afforded for comparing the productions of various manufacturers; the aim throughout being to demonstrate the advantages of gas in all its various applications. The Society of British Gas Industries, by their ready assistance, greatly facilitated the arrangements which were required in this direction.

Council Meeting at Leeds.

The April meeting of the Council was held at the Leeds University, by invitation of the Vice-Chancellor (Dr. Sadler), who, with Professor Smithells, welcomed the members. A visit was subsequently paid to the laboratories where research and other work is being carried out under the supervision of Professor Cobb, the Livesey Professor of Coal Gas and Fuel Industries.

(Signed) Edward Allen, *President.*
Walter T. Dunn, *Secretary.*

May 29, 1914.

THE BENEVOLENT FUND COMMITTEE'S REPORT.

The Committee of Management of the Benevolent Fund of the Institution in presenting their report for the past year express their deep regret at the loss sustained by the death of Mr. Charles Meiklejohn, of Rugby, "whose devotion to the objects which the fund has in view was exemplified in so many ways."

During the year the Committee have granted assistance in sixteen cases, after giving the circumstances of each the fullest possible consideration. The number receiving assistance from the fund at the present time is fourteen.

The accounts show that the income of the fund for the year ended Dec. 31 amounted to £410 1s. 10d. Subscriptions produced £224 18s. 6d.; donations, £76 8s.; interest on investments, £106 6s. 11d.; and deposit account interest, £2 8s. 5d. The expenditure amounted to £363 6s. 6d. This consisted of £346 3s. granted to widows, orphans, and members; £11 9s. 9d. for printing and stationery; £5 11s. 3d. for postages, receipt stamps, &c.; and 2s. 6d. for bank charges—leaving a credit balance of £46 15s. 4d.

The Committee point out that had it not been for the unexpected Jubilee donation of fifty guineas given by Mr. Thomas Newbigging, D.Sc., there would have been a deficit of £5 14s. 8d. Last year the deficit was about £20. A number of subscribers, moreover, have been removed by death—thus further reducing the income.

This condition of the fund shows that more support is needed to enable the good work to be continued and maintained. The Committee, therefore, most earnestly appeal for subscriptions from those who have hitherto not assisted. In this connection it may be stated that the total number of members of the Institution for the year 1913 was 875, of whom only 273 subscribed to the fund.

The members of the Committee retiring by rotation at the forthcoming annual general meeting are Mr. H. C. Head, of Winchester, and Mr. J. Ferguson Bell, of Derby. To serve in their places the Committee have nominated for election Mr. Daniel Irving, of Bristol, and Mr. Alexander Wilson, of Glasgow; and to succeed to the vacancy caused by the death of Mr. Meiklejohn they have elected Mr. F. W. Stevenson, of Coventry.

VENTILATION BY SUN-BURNER.

An Excellent Example at York.

We are indebted to Mr. Harold E. Bloor, the Engineer, Secretary, and Manager of the York Gas Company, for the accompanying photographs of the dining-room of the Masonic Hall, in Duncombe Place, York, in which a "Nonpareil" inverted incandescent sun-burner has been fitted. This burner is manufactured by Messrs. James Milne and Son, Limited; and its arrangement was described and illustrated in the pages of the "Journal" for July 23, 1912 [p. 249].

The light installed in the Masonic Hall at York has sixteen burners; and the height of the mantle-ring from the floor is 13 ft. 3 in. The room (the overall dimensions of which are 26 ft. 6 in. by 36 feet, was previously lighted by upright incandescent burners on brackets, in addition to three two-light pendants. The lighting effect was good, but the ventilation was very deficient. The fixing of the ventilating shaft, Mr. Bloor states, proved a somewhat complicated matter, as it had to be formed to go round both sides of the main beam carrying the roof. The beam was covered with sheet asbestos, and a space of about 3 inches left between the ventilating shaft and the sheeting. The latter becomes hand warm after the light has been on for some hours. The lighting of the room is perfect, as will be seen from the photograph; and the appearance of the fitting, with the lustre shade, is all that could be desired.

In Mr. Bloor's opinion, the satisfaction given by this light is an important matter to his Company; for most of the influential men of the city are either members of the lodge or are guests from time to time, and the lighting and ventilating effect is invariably commented upon in the most flattering terms.

ELECTRICITY SUPPLY MEMORANDA.

It will not be long before the public will be brought to believe, and with good reason, that many of the fires the causes of which are described as "unknown" are electrically produced. The daily newspapers, no one can have failed to observe, have (however good the ground for the assertion, largely dropped saying, when reporting upon fires, that it is supposed the fire was due to a "short-circuit" or the "fusing of wires." The silence is significant. We have no doubt that the amended practice is due to the pressure brought to bear upon the editors by representatives of the electrical industry. However, there is no question that fires the causes of which are said to be "unknown" have of late years —the years of the greater use of electricity—been on the increase. It is also noticeable that, during recent years, a large number of factories have been destroyed, following the installation of "valuable machinery," which inquiry sometimes shows has been of the electrical order. Information as to the dangers of electrical equipment is now spreading in other ways—in one way, through the Law Courts; in another way, through mouth to ear circulation; in another way, through the compulsory notice which at their conferences electrical men have to give to the dangers which face them, and reference to these matters in the General Press through the technical contributors' columns. Touching this last-named method, it was not long since that a paper by Messrs. Faye-Hanson and J. S. Peck, read before the Institution of Electrical Engineers, had notice in a prominent morning paper in a paragraph headed "Short-Circuit Dangers." In this, it was pointed out that generating stations and generating units are largely increasing in size—due chiefly to the extension of the use of electrical energy for industrial purposes, and partly to the increased use of current for domestic purposes. Thus, it was added, the time is fast approaching when a serious disaster to a large supply station may pass from a mere inconvenience to a civic calamity. The reader was also informed that the large stations have a power of causing internal and external damage quite beyond that possessed by a station of small or moderate size. To reduce the amount of damage to a minimum, and to confine the trouble to the particular section of plant where it occurs, limiting "reactances" are being extensively adopted. These reactances are coils placed in the power station between the generators and the circuit-breakers, in the feeding lines, or in the busbars, in such a way that, if a short-circuit occurs on any of the feeders, no damage is done to the generators or circuit-breakers. But with reactance-coils placed between the generators and the circuit-breakers "synchronous apparatus may fall out of step, and a complete shut-down may follow a short-circuit on a feeder or a busbar. On the other hand, a disadvantage of reactances in the feeders—*i.e.*, beyond

Fires and Failures.

the circuit-breakers—is that a short-circuit in the generators is possible that may damage the generator windings and circuit-breakers, and so cause a complete shut-down." We do not imagine the public are very much concerned with reactances; but they are with the question of continuous supply if patrons of a central station, or of public places in which electricity is used.

An Inquiry Wanted at the Foreign Office.

To return to the question of fires, it is clear that the dangers of electrical wiring that is not absolutely tip-top in itself and in its installation (even then the very best form of wiring is not warranty of positive safety) are obtruding themselves more and more upon public and professional minds. The recent case of the War Office against Messrs. Kirkland and Capper and Mr. J. H. T. Woodd brought the matter into prominence; and the issue of that costly piece of litigation will cause architects and electrical consulting engineers to be very careful in future, for their own protection, as to what they recommend in the shape of an electrical wiring installation. To the result of the case may probably be due a development to which a correspondent of the "Electrical Review" by the name of Sykes—B. S. Sykes to be exact—calls attention. We do not read the "Daily Herald;" if we did, we should not pay much heed to what it had to say about matters electrical. But Mr. Sykes states that that organ, which is devoted to labour politics, has published a series of articles in which it is declared that nearly all the public buildings down Whitehall are in hourly danger of fire, owing to defective electrical installations. If this be true, then the sooner the electrical staff at the Office of Works bestir themselves, the better, as nothing would do the electrical industry more damage, and incidentally do some good to the lighting business of the gas industry, than for the demolition of a Government building by fire caused by an electrical fusion. But we do not anticipate any such mishap, seeing that the electric lighting installations in the buildings are subjected to an amount of nursing and inspection such as is not given, and could not possibly be applied, to an ordinary domestic installation. At the same time, despite all the inspection and care, there was not very long since a fire at the British Museum and one in the basement of a Government Building in Whitehall; but both were confined to close quarters, owing to the constant guarding of the buildings by attendants. Had there not been watchful attendants about, in both instances the consequences might have been very serious to the nation. However, to revert to Mr. Sykes and the "Daily Herald," he says that, if the statements published by that organ are untrue, the writer ought to be dealt with severely; if true, they are of such a serious nature that the Technical Press, the contractors of London, and the general public ought to agitate for an inquiry. But how are the Technical Press, the electrical contractors of London, and the public to get to know whether or not they are true? The gravity of Mr. Sykes's letter is in its tail. He says: "Friends of mine whose business is in the Foreign Office tell me the whole office is in a ferment; and they certainly speak as if quite a lot of things spoken of in these articles are true." Now we submit that the first and easiest thing to do is to inquire into the truth of this allegation regarding the "ferment" at the Foreign Office. Mr. Sykes might be called upon to open the evidence by disclosing the names of his friends and informants.

Confirmation.

Since the foregoing was in type a Mr. W. J. Webb has written to our contemporary confirming the rumours as to the condition of the wiring in the Government buildings, and, in doing so, he seriously adds to the allegation. He says: "As an ex-employee of the Office of Works, and having a first-hand knowledge of the condition of the wiring in a large number of public offices, I can assure Mr. Sykes that the wiring of some buildings is 'rotten.' This knowledge is common property among the electricians employed by His Majesty's Office of Works Department. I have seen the wiring also of a comparatively recent job, and have no hesitation in saying that it is one of the worst electrical jobs I have ever seen. . . . I, too, with Mr. Sykes think that a public inquiry should be held, and may say, in conclusion, that to make these various buildings 'safe' would require the expenditure of thousands of pounds."

Wiring Litigation and Publicity.

In addition to the evidence of danger from defective electrical installation given in the War Office case, there is indication, through the publication of reports of other recent litigation, that users of electricity in private residences are on tenterhooks concerning the installations on their own property. There was the action recently in the King's Bench Division, in which Mrs. Irene Osgood, the authoress, of Guilsborough Hall, Northampton, sought to recover damages for a defective installation against Mr. Leo Sunderland, an Electrical Engineer, of Victoria Street, Westminster. The installation was made in 1904; and it is only lately that there has been discovery of a condition of things that suggests that Mrs. Osgood and Guilsborough Hall may consider themselves highly fortunate in not having been the victims of a disastrous fire. Had there been one, it would no doubt have been attributed to a faulty flue or to the throwing down of a match after lighting a cigarette or, to some other excuse which would not have been a fact. The evidence showed that, where there could be inspection, the wires were protected by casing; where there could not be inspection under ordinary circumstances, the wires were bare. One of the witnesses was Mr. W. C. Mansell, an Electrical Engineer of Northampton. He asserted that he had inspected the wiring on behalf of an Insurance Company, and found a great many wires without tubing and hardly any casing. "It was a very bad job. Where the work could be easily seen, it was all right; where it was not easily reached, it was bad." Counsel: "What would be the effect of leaving the wires uncovered?" Witness: "It would cause leakage and waste." Counsel: "Would it be safe?" Witness: "No; in the condition the wires were in, there might have been a fire at any time." There was quite a lot of evidence of this kind; and Mr. Justice Bailhache came to the conclusion that the work was badly done, and that steps were taken to conceal it. His Lordship assessed the damages at £170, with costs; but, with regard to the plea of the Statute of Limitations, there was judgment for Mr. Sunderland, with costs. The Insurance Companies, we all know, have been very seriously hit by electrically generated fires; and they appear to be growing extremely cautious now about the manner in which electrical installations are made. For this they cannot well be blamed. Experience for them in this matter has been a very expensive lesson. There has also been a case before Mr. Muir Mackenzie, one of the Official Referees of the High Court, in which Mr. H. J. Godfrey, an electrical engineer of Balham, claimed from a Mr. Cox £89 8s., the balance of an account in respect of alterations made to the electric lighting and heating installation at his house—Belmont, Streatham. It was frankly admitted by the plaintiff that there were certain defects in the installation and gaps in the joints, but that these could be put right (as he had offered to do) at a small expense, and to the satisfaction of the Electric Supply Company and the Insurance Company. However, Mr. G. H. Kilsby, an Electrical Engineer, agreed that the gaps should not have been in the installation, as they "might be dangerous." Quite a mass of evidence on behalf of the defendant was given as to the work being defective and unsatisfactory. The Referee found that the outside work was bad, and the inside work faulty. He found for the defendant to the extent of the value of the work that he had to have done again (£53 6s.); and the balance between this and the £89 8s. claimed would be paid to plaintiff out of the £38 8s. that the defendant had paid into Court. Mr. Cox also obtained his costs. There have also been further cases lately under the Factory and Workshops Act. There was one at South Shields—Messrs. Pyman, Bell, and Co., Limited, being summoned for having failed to cover certain overhead wires with insulating material, or so to place and safeguard the wires as to prevent danger. Through an accident at the works on March 12, a man named Beck was killed by electric shock. A fine of £5 and costs was imposed. At the Durham County Sessions recently, the Coal Distillation Company were similarly summoned. As a result of certain electric wires not having been covered with insulating material or otherwise protected, at the bye-products works of the Company at Littleburn Colliery, a man named Blackburn was killed in February. A fine of £10 and costs was imposed. These two cases, however, are, of course, of a different order from the three regarding defective wiring which have recently been in the High Court.

Contractors and Fitting Work.

What is to be said, in view of all this evidence as to defective wiring work, regarding the value of the elaborate wiring rules of the Institution of Electrical Engineers, of the Fire Offices, of the Home Office, and of the Board of Trade? The Home Office appears to be the only authority with the proper and necessary machinery to see that their rules are complied with and adhered to, and to compel compliance. The rules of the Institution and of the Fire Offices are violated every day, and especially in these days of jerry-building in the suburbs, in connection with which cheap and nasty wiring installation suffices—the builders not wanting to pay much for it, and contractors being at hand who are willing to engage in this class of work. In view of all the trouble existent, and that is being built up for them, it appears to us that the electrical suppliers have good ground for complaining of the contractors for wiring and general installation work. The matter of their relations has again been raised in some correspondence that has passed between the Bristol Electrical Contractors' Association and Mr. H. Faraday Proctor, the Electrical Engineer to the Corporation. The contractors desire to obtain more profit from the work that they do under the instructions of the Electricity Department; but Mr. Proctor says that the faulty material the contractors have supplied in the past has given rise to so much trouble that he cannot see his way to recommending his Committee to depart from the present practice. When wiring work is given out to the contractors, they are supplied by the department with the necessary switches, fuses, and wood blocks; and the department also takes the profit on the fittings and lamps sold for the job through its show-rooms. The contractors certainly cannot get much profit on what is left to them; and the question arises as to whether, under these conditions, they may not be tempted, when they are carrying out the wiring work, to execute it in the manner of which complaint was made by Mrs. Irene Osgood, as noted in a previous paragraph. The contractors at Bristol contend that, in connection with any wiring work which they execute through the Corporation Electricity Department, they ought always to have (say) 15 per cent. on fittings and lamps sold, in

connection with the job, through the department's showrooms, and that they ought to be allowed to supply the goods now served out to them by the department. Mr. Proctor thinks otherwise. He holds, regarding the sales through the show-rooms, that, seeing the department is put to considerable expense on account of the show-rooms and publicity, it is only equitable that this expense should be met to a certain extent by profits which can be secured on the sale of fittings. The contractors, on the other hand, are of opinion that the expense of the show-rooms and publicity should be borne by the profit on the electricity supply; the object of the show-rooms and publicity being primarily to increase the sale of electric current, and not to make a profit on fittings and lamps. There is something in this contention. But supposing the department adopted the hint, and supplied fittings and lamps at cost price to benefit their electricity business, the contractors would really be worse off. While the department supplies fittings at such a profit that the contractors think they could well be allowed 15 per cent. on the cost of those purchased for jobs in which they are concerned, it seems that there is room for the contractors to undercut the department in the sale of fittings and lamps, and yet make a profit. As to the correspondence, it has not turned the Electricity Committee; and they have resolved to support Mr. Proctor in the stand he has made.

Disappointed Hopes.

The Industrial Committee of the Institution of Electrical Engineers is dead; the Council having just consented to its dissolution. The Committee was created with all good intentions and a hope for a wealth of beneficent work. The result is that the members of the Committee have recognized that they in corporate capacity are a worthless body, unless they can have broader powers, and all that is necessary to enable them to effectively carry on the work of protecting and promoting the legislative and industrial interests of the industry. The Committee suggest as an alternative a distinct organization for the purpose—apparently recognizing, as the Council of the Institution do, that the Institution itself is trammeled here and there by its composition from performing the best possible in connection with political and industrial matters. As to increasing the powers of the Industrial Committee, the Council hold that they possess no right to delegate any part of their own functions to the Committee, nor to grant plenary authority for the Committee to act independently of the Council. So the Committee becomes defunct. No one seems to find any particular cause for lamentation; for the industrial body has grievously disappointed the high expectations formed at its inception. The Council have not, judging from outward indications, taken a great deal of notice of the proposal for the creation of a separate organization to deal with industrial and legislative matters. As a matter of fact, there has not been much encouragement given in the electrical industry to the running of organizations that require financing; the secret of this probably being that such a large proportion of electricity concerns are owned by local authorities.

The Cynic and his Work.

The weakly (almost weekly) gibes that "Meteor" of the "Electrical Times" has at gas increase in feebleness. He has been referring to the statement made at the Newcastle Conference of the British Commercial Gas Association, that some 80 per cent. of the medical men of the city have adopted gas-fires. He cannot deny the truth of this, nor can he deny the truth as to the large percentage of medical men in London and elsewhere who are now advocates, and users in their own homes, of gas-fires, on account of both their heating and hygienic virtues. In his masterly cynical way he says: "As for progress, gas marched on from strength to strength; it had a mighty future. But not everywhere. At Blackburn, during the past financial year, there has been a splendid profit on the electricity and tramways, and a heavy loss on the gas. The decrease in net income from the sale of gas alone was £4282; and this has not been counterbalanced by a rise in the value of residuals. The total loss is £10,322. We mention Blackburn merely because it is the latest instance that happens to come before our notice." Has "Meteor" already forgotten the long and costly war that the Blackburn Corporation Gas Department waged last year against trade union tyranny? We hardly think so. But he wanted to make a point, and so treated with contempt propriety and fair recognition of abnormal conditions. Would he mind publishing a list of electrical undertakings that, without a strike of long duration, failed during 1913 to make a substantial net profit and full and proper provision for reserves and depreciation? And, if he has time, he might read two short paragraphs on Rio de Janeiro in our "Notes from Abroad" in the last two issues of the "JOURNAL."

The official report of the proceedings at the eighth annual meeting of the American Gas Institute—a copy of which has just reached us—fills two bulky volumes. The meeting, it will be remembered, was held at Richmond (Va.) in October, under the Presidency of Mr. W. R. Addicks, a portrait of whom accompanies the "Transactions." The volumes are amply indexed; and a glance at the number of folios appearing after the name of the President under the heading of "Speakers," shows how thoroughly Mr. Addicks carried out the duties of the chair.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Programme of the Forthcoming General Meeting.

THE Fifty-Fifth Annual General Meeting of this Association will be held (as already announced) at Munich from the 30th inst. to the 4th prox. The inaugural evening assembly will take place on Tuesday, June 30, in the large hall of the Hackerbräukeller, where the members will be entertained by the Corporation of Munich.

Technical proceedings will occupy the mornings of the three following days, and will take place in the large hall of the "Bayerischer Hof" Hotel. After the inaugural address of the President (Herr Reese, the Manager of the Dortmund Water-Works), the following papers relating to the gas industry will be taken on the first day (Wednesday, July 1): "Review of the Position of the German Gas Industry and the Exhibition of 1914" by Herr Lempelius, of Berlin; "Gas and Hygiene" by Dr. von Gruber, Professor of Medicine at Munich; "Efforts of the German Gas Industry for the Public Weal" by Herr. E. Körting, of Berlin; and "International Standard Screw-Threads" by Sir William Lindley, of Frankfort-on-the-Main. On the next day, the following communications relating to water supply will be received: "The Bearing of the Prussian Water Law on the Water Supply of Towns" by Herr Kreutz, Permanent Member of the Berlin Water Bureau; "Afforestation in Relation to Water Supply" by Herr Henle, of Munich; "The Removal of Manganese from Drinking Water" by Dr. Tillman, of Frankfort-on-the-Main; The Removal of Maganese from Underground Water in the Elbe Valley and the Plant Provided for Dresden" by Herr Vollmar, of Dresden; "The Biological Results of Rapid Filtration at the Barmen Valley Dam" by Professor Kolkwitz, of Berlin; and "A Graphic Representation of the Electric Driving of Pumps" by Herr M. Gaze, of Berlin. The third day's technical programme will include papers on "Gas Rates" by Herr Göhrum, of Stuttgart; and on "Gas Heating" by Dr. Karl Bunte, of Carlsruhe. The reports of the Technical Committees of the Association will be taken on this day, as well as the annual report and accounts, and the officers and place of meeting for the ensuing year will be chosen.

A choice of visits to various places of interest—including the Museum, the Technical College, and the gas-works—is being given for the afternoon of July 1; and in the evening of that day the members of the Association will jointly attend the grand formal opening of the Gas Exhibition by His Majesty, King Ludwig III. of Bavaria. The exhibition will also be visited the following afternoon. The banquet of the Association will take place on the evening of Thursday, the 3rd of July; and on Friday, the 4th, members will participate in one or other of four whole-day excursions. A special programme has been arranged for ladies for the mornings on which technical proceedings are being taken.

WORKS TOPICS.

By "Modus Operandi."

THE PAYMENT OF INADEQUATE SALARIES.

THE munificent (!) sum offered as salary in the advertisement for the new Engineer and Manager to the Macclesfield Corporation will, it is hoped, meet with the reception it deserves. Complete disregard must have been paid to the qualifications required by the man who controls an important gas undertaking. It is not only a question of managing the works and plant as they exist, but it is also essential that the engineer and manager must be competent to advise on future extensions, often running into an expenditure of many thousands of pounds, and on matters of policy, on which none but the most experienced men can advise. Unbounded tact—much more so, in fact, than with a company—is an essential qualification of the head of a corporation gas undertaking; for he has to satisfy, on the one hand, a politically formed committee, and, on the other hand, to control a body of workmen, supported, as is invariably the case, by a Socialistic section on the committee. One can only repeat that the essential qualifications for such a position are indeed stupendous. None but a diplomatist of the highest order can hope to succeed in the face of such difficulties.

What can be expected in return for £300 a year? Certainly nothing approaching the requirements. The station superintendent of a works making about a million feet of gas a day, or a district superintendent in a similar-sized undertaking, would be fairly paid at such a salary. The assistant engineer and manager in the smaller undertakings, ranging from (say) 200 to 400 millions a year, would be underpaid at anything less than this amount. And yet such positions demand qualifications of a totally lower order than those required by the administrative chief of an undertaking. Such a man must be endowed with considerable personal qualities, in addition to engineering skill and ability in the management of works and district.

THE DEL MONTE SYSTEM OF CARBONIZATION.

A good deal has been written recently of the Del Monte low-temperature carbonization process; and as it is always possible that this, or a similar, system may at some future date become a

feature of gas-works practice, it may be of interest to describe the principle of its working.

The Del Monte system of carbonization, as now arranged, consists of one or more iron retorts, circular in shape, of 16 inches diameter and about 16 feet in length, bedded in a brickwork setting and fixed in a slanting position of about 15 degrees. At the lower extremity suitable coal-hoppers are fitted to the retorts, and are so arranged that the coal feed completely fills the entire space of these hoppers. Immediately above the hoppers is placed a plug cock, through which the coal can be admitted without allowing gas to escape or air to enter. At the upper extremity of the retorts similar hoppers are fitted to receive the coke as it passes from the retorts; while underneath these hoppers is fixed another plugcock, to enable the coke to be discharged into receptacles below. Inside each retort is placed an archimedian screw, which is constructed of cast iron in sections, and is mounted on, and keyed-to, a steel tube. This tube projects through both coal and coke hoppers, and is used for the dual purpose of rotating the screw by means of ratchet gear, fixed at the lower end, and of being used as a flue for heating the inner portion of the charge of coal. The screw is continued into the hoppers at each end; so that by its rotation the coal is conveyed from end to end of the retort, according to the speed at which the screw is driven by the ratchet and pawl, which is, in this instance, operated by a slowly reciprocated hydraulic ram.

The retorts are heated by means of the gas made in the process and air, each of which is distributed from the upper end, under pressure, to separate perforated iron pipes placed immediately under the retorts. The iron retorts are bedded upon thin tiles, which protect them from the high ignition temperature at this point. The products of combustion pass round and over the retorts to a chimney at the lower end. In the flue space round the retorts broken-up refractory material is placed, for the purpose of supporting the retorts and of distributing the heat to greater advantage. It has already been mentioned that the tube, fitted inside the retort and used as a driving-shaft for the screw, is utilized for heating the inner portion of the charge by means of gas and air distributed under pressure, and burnt inside the tube; the products of combustion passing out at the lower end.

The gas made in the process passes off at the lower end of the retorts through the coal-hoppers into a condenser and scrubber, in the latter of which it is washed by water for ammonia recovery. It then passes into a gasholder, from which it is re-circulated by an exhauster, which forces the gas into the top end of the retort against the travel of the coal. By this means the coke is cooled (before its discharge) by the entering gas, which, absorbing heat from the hot coke, gives it up again to the cold coal entering the retort. The passage of the gas under pressure has also the effect of causing the oil as made to flow freely into the outlet fitted underneath the coal-hoppers.

The slanting position of the retorts is, of course, arranged for the purpose of facilitating the passage of the oil. It is found in practice that, largely due to the re-circulation of the gas, the centre of the retorts are heated to a higher temperature than the two ends. The exhauster is also used to distribute the gas into the inner and outer flues for heating the retorts; while the air for combustion is supplied by means of a fan.

Points from Mr. Carr's Paper.

Considerable interest will be taken in the paper on the "Application of Stoking Machinery in Small Gas-Works" read before the Manchester District Institution of Gas Engineers, by Mr. W. M. Carr, of Ormskirk, as it is always a debatable subject as to the size of works for which retort-house machinery is justified. Here are works making 400,000 cubic feet of gas a day; and yet few engineers would gainsay the fact that a strong case was made out for the installation of this machinery. On this account the paper was particularly opportune, and will no doubt be the means of encouraging other engineers of small works to take a similar step. A great many engineers, however, would question the advisability of adopting horizontals in preference to verticals.

In the estimated carbonizing results given by the author, and in which hand and machine stoked horizontals and verticals are compared, it is assuredly anything but convincing to give widely varying figures for the coke made for sale per ton of coal. Why should hand-worked horizontal retorts yield only 10 cwt., machine-worked horizontals 11·5 cwt., and verticals 10·5 cwt.? In all cases the most modern type of regenerator furnace is equally applicable. Surely it would have been fairer to have assumed equal productions in each instance. In the case of verticals, it is possible that the absence of water is the cause of the lower figure; but the coke being absolutely dry, a proportionately higher price should always be obtainable, provided that the selling is conducted on proper lines.

Mr. Carr is unconvincing in the matter of the respective advantages of small and large charges; and it is noticed that several speakers in the discussion criticized his remarks on this subject. In this connection it is noteworthy that some difficulty was experienced in the choking of the tar-main leading from the hydraulics to the tower. This is probably greatly accentuated by reason of the small charges and the resulting thicker tar produced. I should dispute the contention that the use of a 9-inch tar-main, in place of a 6-inch main, will improve matters, as it is generally considered that a quick flow of tar from the hydraulics to the tar-tower is essential, especially if the tar be thick and the temperature be high, as is the case with small charges. Having had experience with 4-inch and 6-inch tar-mains, I should (quite contrary to Mr. Carr's recommendation) prefer to adopt the former size on future occasions, and would certainly never contemplate the use of a larger tar-main than one of 6 inches.

Having regard to the recent discussion in this column of the respective advantages of belt-driven and direct-coupled coal-breakers, it is interesting to notice that Mr. Carr states that the direct coupling of the coal breaker and electric motor has proved a satisfactory arrangement. It would be instructive to know the result of a sudden stoppage of the breaker. Something must surely be damaged in such cases.

The discussion that followed the reading of the paper was a compliment to the author, who must be congratulated on the very interesting nature of his contribution.

THE TREATMENT OF PREPAYMENT CONSUMERS.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

I have read with as much surprise as regret some of the general conclusions arrived at by Mr. John Carter in his paper presented to the Eastern Counties Gas Managers' Association on April 24—especially the closing sentences.

Why an engineer and manager of a gas-works should make a statement to the effect that "a powerful and opulent industry has singled-out the prepayment consumers for exceptional and unfair treatment," I cannot conceive, especially as no actual facts or figures are given in support of such a sweeping indictment. There is only the Lincoln experience, which is so exceptional in character as to be almost unique, and quite useless as an example of the general practice, and a quotation from an ancient report, the author of which evidently works under conditions altogether different from those obtaining at Lincoln. There is nothing to show that the figures quoted by the well-known engineer are not absolutely correct as regards the district to which they apply. At the present time our industry is being closely watched by competitors, desirous of using every means of prejudicing and creating ill-feeling against gas and gas undertakings; and it is remarkable that they should be assisted in this respect with a weapon from inside the profession, which will be used to the general detriment and discredit of our industry.

The history of the growth of gas sales, from a very small beginning to their present proportions, does not warrant the suspicion of dishonesty conveyed by the suggestion that managers of gas-works have singled-out any class of consumers for exceptional and unfair treatment. If there is any class that could be so treated with impunity, it is not the working class. On the contrary, it clearly indicates that respect for justice (which appears to have animated Mr. Carter in the preparation of his paper) is not limited to Lincoln. What are the continual reductions in price and improvements of service, if they are not evidence of a desire for fair and just dealing? A paper devoted to questions of selling terms is sure of sympathetic reception and full discussion at any meeting of gas managers. Possibly there are one or two exceptional cases in existence that go to support the views held by Mr. Carter. But one swallow does not make a summer; and any attempt to draw general conclusions from such evidence is following the Tooley Street order of argument.

The same applies to the ignorant manager, who is supposed to flounder in the dark, as regards the actual cost of his gas installation. Gas-works managers are called upon to get out the cost of something or other every week; and the average individual will not find that a fair and accurate statement of the costs incidental to the introduction of a slot system is a very great strain on his resources. His preliminary estimates, too, can be checked and corrected, if necessary, in the light of accumulated experience, though it by no means follows that the first estimate is always excessive.

The obligations incurred by the undertaking are of a fixed and definite character. But the obligations of the consumer, as represented by the agreement to use gas regularly, are not of a corresponding character. They can be nursed and encouraged to some extent by skilful management; but there is no definite guarantee corresponding to the fixed outlay. If the average consumption per slot consumer, and the average outlay ranged within narrow limits, there might be some possibility of laying down general laws as to the maximum load charge. But they vary so widely that the same may, with reason and justice, be subject to a wider proportionate variation than the charge to the ordinary consumers. Mr. Carter will scarcely contend that, because he is able to sell gas at 2s. per 1000 cubic feet, others, less favoured with regard to price of coal and other circumstances, who charge 4s. or 4s. 6d., are guilty of exceptional and unfair treatment, and are surrounded by "sleeping dogs" who will one day wake up, to the general discredit and discomfort of the undertaking in question.

But his argument appears to take the line that because, under the exceptional circumstances prevailing at Lincoln, he can claim to run the slot department nearly as cheaply as the ordinary, a load charge of 10d. or 1s. cannot under any circumstances be justified. Within my own knowledge, the average consumption of gas, in the slot department, ranges from a minimum of 8000 to a maximum of 18,000 cubic feet per annum, and the average outlay per consumer (from a bare slot meter only) up to £4 in

addition—approximately a total of £2 to £6 inclusive of meter. The difference in these two items alone—the average consumption and the average outlay—may warrant a variation of more than one to six in the load charge. Ten per cent. per annum on the outlays to cover interest, maintenance, and depreciation, cannot be said to be excessive; and the annual charge for this item would be 4s. to 12s. per consumer. These figures, reduced to "per 1000 cubic feet of gas," may range from 8d. to 2¼d. for the maximum, and 1s. 6d. to 8d. for the minimum consumption.

This disposes of the assertion that a loading of 1s. is necessarily unjust or unfair. It would be more easy to find instances where the loading is designedly kept below the fair limit than above. In small towns, or places located 100 or 200 miles or so from the nearest colliery, where the ordinary price is necessarily high, a loading of so much as 1s. may bring the price to a figure so high that it prejudices the use of gas for cooking, and a much lower limit must be fixed if anything like a remunerative average consumption is to be secured. The prevailing opinion in the profession is that the slot system should be self-supporting, without any assistance from the general expenditure, and that it should not be taxed for profit beyond the proportion contributed by the ordinary consumers. There is also a very general impression that when the slot business is new and additional to the other, and can be met without proportionate additions to the capital, or to working expenses, some reduction may be allowed from the calculations arrived at as above, without violating these conditions, and that some allowance should be made for cash payment. But for these considerations, the load would be considerably over 1s. in many cases.

There is no such thing as one-sided justice in any matter of business, because the interests of at least two parties are concerned in every transaction. The "sleeping dogs" may also be found among the ordinary consumers, the employees, or the shareholders. In either case the awakening will be attended with unpleasant, and possibly disastrous, consequences; and excessive anxiety in respect to one class may result in the operation known as "robbing Peter to pay Paul." The ordinary consumer may claim that, although in many instances he is now in the minority, as far as mere numbers are concerned, he accounts for three times as much gas as the prepayment, and provides a corresponding proportion of the total profit. A user of ten to twenty times as much gas as the average slot customer may complain (and with some reason) that he should not be made to pay part of the extra cost of the slot as compared with the ordinary meter, or any other portion of special expenses. If the slot customer is supplied in any respect at less than cost, who makes up the balance?

Importance and Advantage of the Slot Department.

While quite in sympathy with the remarks as to the importance and advantage of the slot department (to the undertaking that adopts it on the usual lines), I do not at all see why this class of customer should expect to monopolize the whole benefit of the capital that has been invested, and the skill and enterprise that have been put forward on his behalf. Gas undertakings are supposed to be worked on commercial, and not on purely philanthropic, lines. It has certainly in most instances enabled the gas manager to enormously increase the number of consumers, by tapping a numerous class that were formerly beyond his reach. Incidentally, it may be remarked that this desirable and beneficial result has not been obtained at Lincoln. If out of 4800, 4700 are only replacements of ordinary meters, and not new business, it is difficult to see where the advantage of spending £7000 to £8000 on slot meters, and having 4700 ordinary thrown out of use, comes in. Possibly some benefit has been secured that does not appear in the paper; but apart from this, such a large outlay is a heavy price to pay for simply meeting a preference on the part of the consumer, getting in the money perhaps two months earlier, and possibly reducing bad debts. Would not a system of short-period collections, as in Manchester and elsewhere, be an equally efficient and a cheaper means of meeting the requirements?

A notable omission from the paper is the absence of reference to free fitting, without which a paper on slot meters is like the play of Hamlet without the leading character. The "numerous class that were formerly beyond reach" consists chiefly of weekly tenants, who are not able, or are not inclined, to pay for gas-fittings down on the nail, and the landlord or owner does not consider that gas appliances are a necessary part of the fixtures. In this connection, it would be interesting to know who provides the gas-fittings at Lincoln, because if there is any way of avoiding the expense and responsibility connected with free fittings others may be glad to know it, though I would suggest that an important feature contributing to the success of the slot department generally, is that gas undertakings accept the whole responsibility up to the burner.

At Lincoln, the rule seems to be to supply meters rent-free. But the slot, as compared with the ordinary, costs 50 per cent. more in the first place, and comprises additional machinery that requires to be kept in going order and repair. The slot meter means additional outlay and additional maintenance; and the ordinary consumer may well complain that he should not be called upon to find 70 or 80 per cent. of this special expense.

Mr. Carter credits himself with a very cheap slot collection that compares favourably with ordinary quarterly accounts. In this respect, as in most others, he is in an exceptioual position. He makes only four clearances per annum, whereas the usual rule is eight. The general impression is that short clearances make honest consumers, and that the bare fact of knowing that at times there is a three months' accumulation in the cash-box is of itself an incentive to dishonesty. And where a set of appliances and fittings is provided by the undertaking, it is desirable that the gas inspector should be in evidence oftener than once in three months.

Under the Lincoln circumstances, with a low price for gas, the quarterly clearance is not more than 7s. or 8s., and four visits a year are probably sufficient. But when making comparisons of a general character, it must be remembered that eight visits a year cost twice as much as four. Also that the bare cost of emptying the cash-boxes and delivering the bags at the office is not a complete presentment of the cost of collection, as compared with the ordinary collector who usually banks his takings, and enters them in a cash-book ready for transference to the rental. To get a fair comparison, the cost of checking-up the coppers at the office, sending to the bank, and entering up the slot cash-book should be added. It appears obvious that a collection made up entirely of pennies, and comprising 7s. to 8s. per item, cannot possibly compete in the matter of cost with the ordinary system, in which nearly all sums over £5 are paid by cheque, and the average per item is 20s. to 30s. Not only the actual collection, but the clerical work involved is less per £1000 collected by the ordinary system, after allowing for writing out and delivering the bills, because the number of accounts to be dealt with is about one-third. The slot collector has to make one visit per item certain, and in a few cases two. But the ordinary collector gets several cases where two up to a dozen accounts are delivered at one place and paid in one cheque, and where there is a town office and show-room (who is without one in these go-ahead commercial days), there is a large and increasing proportion of the ordinary accounts paid at the office. I think few will agree with Mr. Carter that the additional cost of collection and clerical work, as compared with the ordinary system, is a negligible item.

Relative Costs of Collection.

Comparisons of the cost of collection, stated as a percentage on the sum collected, or per 1000 cubic feet of gas sold are, therefore, illusive, because the number of visits, and the work to be done, is in no way proportioned to the amount received or the sale of gas. It is more a question of average takings per visit, which is influenced by the price of gas and the average consumption. But with gas at 2s. 2½d. per 1000 cubic feet, and an average of 3750 cubic feet per visit, Mr. Carter is in a favourable position as compared with others, because where the price is 4s. or more, the average consumption tends to be less, and with eight visits a year the average per visit is less rather than more than 8s. In cases where discount is allowed, the calculations should be based on the net or actual sum received by the Company rather than on the gross. At Lincoln, one-eighth of the £7200 income per annum is repaid to the consumers, involving some additional clerical work, and the actual sum received by the undertaking, as the result of the labours of the slot collector and his assistant, is £6300.

But the cost of collection is not everything; and with this, as other matters, the cheapest is not the best. Something has been said lately to the effect that the collector might with advantage be something more than a machine—that, so far as many of the customers is concerned, he is the representative of the company, and that he has opportunities of stimulating existing business, and of looking after new. The rule of "so many visits per day" is the parent of mechanical collection, and an enemy to enterprise. A man of ordinary intelligence, willing and anxious to discharge his duties to the best of his ability, and to use every means of advancement, endeavours to suit himself to the wishes of his principal. If he finds that he is valued according to the number of visits he can squeeze into a working day, he diverts his sole attention to that end. If he finds that canvassing and missionary work are appreciated at headquarters, and recognized in a suitable manner (which means something more substantial than a smile and a thank you), he will endeavour to fill the bill. But to keep up the full complement of visits, and at the same time to exercise push and enterprise in addition, is indeed a case of making bricks without straw. The same objection must apply to any system of payment per visit, unless accompanied by a bonus or commission on new business introduced. These considerations also apply to collectors of quarterly accounts. There is the same variation in the price of gas, and in the average per consumer. In a poor district the accounts may range perhaps from 15s. to 20s. each; but in a wealthy or manufacturing district they are much larger. A factory, a railway station, or a gentleman's mansion will perhaps pay over three figures.

Concessions to Consumers.

The general view is in favour of concessions to consumers; and these may be in cash or in kind. They may take the form of a deduction at the time of payment, or a "return" at the end of each year, or of something provided gratis—that is, free of a direct first charge, or of any annual charge. The service-pipe up to the meter is usually provided free; but beyond this there is no fixed rule. The general practice up to a recent date was to charge everything, directly or indirectly, beyond the main tap. But it is getting quite usual to make some concession—such as a meter-rent free, no charge for maintenance of incandescent burners, or to supply cookers, grillers, and boiling-rings, &c., which are not sold direct, or charged for as on hire. The real cost of gas to the

consumer is the actual charge *less* the discount and the cost of the free service if any. But he is apt to overlook the free service, or to regard it rather as a lawful way of paying for the privilege of his patronage.

It is also recognized that a discount (whether in cash or in kind) should be accompanied by a minimum charge that will ensure the discount being less, and not more, than the profit earned from the customer. With all customers, ordinary or slot, this limit is not the actual payment, but the net profit on it that is sufficient to cover the discount. Where this is of a substantial character, the limit must also be substantial. Supposing the total concession (cash and kind) costs the undertaking 10s. per annum, and that the average net profit on the total income is 25 per cent. Under such conditions, a customer paying 40s. per annum gets his gas and service at cost price, and the undertaking gets nothing in return for its capital investment, skill, and enterprise. A customer for a smaller amount is a minus quantity in the profit and loss account, as he is supplied at less than cost. If an ordinary customer receives a meter rent free, and the cost to the undertaking is 4s. per annum, he has a first charge on the profit to that amount. Unless he uses 16s. worth of gas per annum, the undertaking gets nothing, and if he uses less it actually loses.

I have found the bonus or return system, combined with a fair minimum based on the value of the service rendered, an excellent assistance to the slot department. The consumers all like the idea of an annual bonus just before the holiday time. I never heard of a single objector. It enables the undertaking to meet small reductions in price without the inconvenience and trouble of altering the price wheels of the meters. It increases the average per consumer, to the advantage of all concerned, because many, in order to be sure of clearing the minimum, go up to 30, 40, or 50 per cent. in excess. In the case of those using gas for only part of the year, but exceeding the minimum for that period —such as a customer who uses more than half the minimum in six months—they should receive a return on the actual quantity consumed. The refusal of the return to a customer who has not reached the limit is perfectly fair and just, as may be proved by the arguments already stated; and it is a means of enabling the undertaking to get some of its own back. If the minimum is 40s. per annum, the return 3d. per 1000 cubic feet, the cost of the free service to the undertaking 8s. per annum, and the load charge 10d. per 1000 cubic feet, a user of 6000 cubic feet per annum will only pay the undertaking 5s., leaving a margin of 3s. dead-loss, which would be increased to 4s. 6d. by payment of the return in addition. As it is, the 1s. 6d. goes to reduce the loss.

The System in Vogue at Salisbury.

Like most of those who adopted the slot system early, before there was any accumulation of practical experience to serve as a guide, I worked out a system on my own plan, to suit the requirements of the district. And having taken the liberty of criticizing Mr. Carter's methods, I now propose to give the main features, not because they can claim any superiority, as compared with the usual practice, but in view of the suggestion that this subject is of sufficient importance to warrant a full discussion; also it seems only English to give Mr. Carter an opportunity of retaliation.

In residential and agricultural districts, the cooker is the main consideration, because two or three lighting burners will not of themselves give a remunerative average. I therefore made a point, in the first place, of a good family cooker, not a little toy of the bachelor type, but with a 14-inch oven, two boiling-rings, and a griller. A necessary adjunct is a 5-light meter in place of a 3-light. I preferred a "shilling in the slot" meter to the "penny," for several reasons. Out of 2700 slot users in Salisbury, there are now only a few dozen penny meters remaining in use; and we are rarely asked for an additional one. Where the price is necessarily in the neighbourhood of 4s. per 1000 cubic feet the pennyworth represents only 20 cubic feet or so, not sufficient to cook a Sunday dinner. Two separate visits to the slot on Sunday morning are too much of a good thing, and suggestive of "what a lot the gas costs." I do not consider it a part of the gas manager's duty to cultivate business among the class known as the submerged tenth; and those who do can scarcely wonder at the number of slot robberies, or the disappearance of gas-fittings in the direction of the old metal dealer's shop. The slot meter is for the use of the respectable weekly wage earner, who finds it more convenient to put in a shilling for the week's requirement on the Saturday night than to leave a stock of coppers lying about for use as required. I do not refuse the penny meter if asked for; but after a full explanation, the customer usually prefers the shilling, and we have not stocked penny meters for some years now. We go to work on the principle that a new customer is good, but increased business with the old ones is better.

In addition to the cooker we supply one to three lights in addition. But it is distinctly understood that not every Tom, Dick, or Harry who likes to apply can have a meter, cooker, and two lights. Every case is considered on its merits, and the customer made to understand that he is expected to use not less than 10,000 cubic feet per annum, and that if he does not do so the whole fit-up may be removed. We have an annual weeding-out. But, as a matter of fact, a cut-off is an exceptional occurrence; and when it has been effected, the customer usually comes round to the office within six months prepared to guarantee the required consumption. The outlay per consumer, starting at the inlet of the meter, averages £4 15s. A reasonably liberal outlay and a good average consumption are more remunerative than a small outlay and a proportionate average consumption. It is the exception, in our experience, for a slot meter to be supplied to a house already piped and fitted for gas. The objection about not being able to check the consumption against the cash has proved in our experience more fancied than real. The average quantity of gas that is hung-up in the meters does not vary greatly, taking one with another.

The shilling is attended with a great reduction in the cost of collection, and also of office work. A collection of £40 per day, in coppers, takes the best part of three men's services—one to empty the cash-boxes, a second to trundle the coin-cart, and a third to count up, bag the coppers at the office, and see them to the bank. But a collector single-handled can bring in £40 worth of shillings by 4.30 p.m., and, with the assistance of a clerk, the money is checked, bagged up, and entered in the cash-book in the course of half-an-hour. The clerk who pays in the sales and counter receipts can take it to the bank. We have practically no loss in the shape of spurious coins. The collector, having only six to ten coins to take at each clearance, readily "spots" anything of a doubtful character, and demands a "good one" in exchange. Posssibly twenty foreign or bad coins pass his notice in twelve months, and these usually realize half their value. We have not experienced half-a-dozen robberies in ten years; and in only one case a consumer was cut-off, owing to a persistent use of co-operative society tokens in place of the legitimate shilling. This immunity is partly due to short clearances, and our officers keeping their eyes open. Once "an elderly gentleman of military appearance" made some dozen attempts to assist our slot collector in his duties, but was unsuccessful, because all our outdoor men wear distinctive lettered caps.

Our load charge is about 9d. per 1000 cubic feet, and the average consumption per consumer 12,250 cubic feet. The highest figure attained in any one year was 15,500 cubic feet in 1904; and the general adoption of incandescent burners is responsible for the fall to the present figure. The average return on an outlay of £4 15s., and extra expenses in addition, is 9s. 3d., which I submit is neither exceptional nor unfair; and I am not living in daily dread of the awakening of "sleeping dogs."

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

PAPER ON "THE APPLICATION OF STOKING MACHINERY IN SMALL GAS-WORKS."

Reply of the Author to the Discussion.

In consequence of the short time available for dealing with the various points raised by speakers in the discussion on the paper "The Application of Stoking Machinery in Small Gas-Works," read by Mr. W. M. Carr at the meeting of the Manchester Institution of Gas Engineers on Saturday, the 23rd ult., the author has, at our request, amplified his reply, and has also dealt with the editorial reference to the paper—more especially as to the heat units basis for comparing results.

Mr. William M. Carr stated that he was optimistic as had been suggested by Mr. Morton Fyfe. Such optimism was, however, born of the results of a full year's working of the plant; and recent work showed that these results could not only be maintained, but improved upon. In comparing the gross cost into the holder Mr. Fyfe claimed a saving by using vertical retorts, of 2d. per 1000 cubic feet; and this with a plant of two-and-a-half times the capacity—*i.e.*, 1¼ millions compared with half-a-million. This 2d. saving claimed, however, which is effected principally on account of the higher yield of gas per ton, was accounted for in the lower quality of gas supplied at Nelson, which Mr. Fyfe stated to be 550 B.Th.U. on an average, compared with 600 B.Th.U., the average quality at Ormskirk. Further, the gross cost of gas into the holder at Ormskirk would be reduced by at least 3d. per 1000 cubic feet were the output of the plant doubled; and it would then be less than the size of the vertical installation at Nelson.

With reference to the question of the value of the extra land necessary for the construction of a horizontal retort-house, this was not a serious matter in the case of the Ormskirk installation, where the extra land required cost about £200; so that allowing for this, the extra cost of a vertical installation would have been £2300. Mr. Fyfe claims that, in estimating the results that could be obtained, justice had not been done to the vertical retorts. The only results from a small plant that the writer was aware had been published are those of the Lurgan installation; and by comparison with these the estimated figures have a large margin in favour of verticals, especially in so far as the amount of coke sold per ton of coal is concerned, which is estimated at 10·5 cwt., whereas the Lurgan returns show only 9 cwt.

Mr. Morrison had raised the question as to the class of coal used. After considerable tests at Ormskirk, it has been found that, in spite of the heavy cartage charges, the most economical coal is fine slack from a medium seam, such as Wigan 4 feet, as the only practical advantage from the higher grade coal is in a higher yield per ton; and this only amounts to about 1500 cubic feet, which would not compensate for an increased price of (say)

3s. per ton. This is clearly borne out by comparing the results on the year's working with a poorer class of coal with the results of a special test made by us when using Arley nuts costing 3s. 5d. per ton more.

With regard to the length of the retorts, the author could not agree that any appreciable capital saving would have been effected by making these 20-feet through, instead of 14 feet through, on account of the larger steel-framed building that would have had to be erected. Further, it would have been advisable to erect ascension-pipes and a hydraulic main on both sides of the retort-bench instead of only on the one side as at present.

It had been contended that little advantage would be obtained by the substitution of a 9-inch tar-main and 6-inch tar-valves in place of the existing 6-inch main and 4-inch valves, and that equally good results could have been secured by giving the 6-inch main a greater fall. The main has, however, a fall of 1 in 40; and it was not possible to give it any greater fall. The rate of flow in the tar-main must always be restricted when the seal is regulated by the flow at the top of the tar-tower; and in dealing with tar which is sometimes more solid than liquid, one cannot rely upon any scouring action being set up. It should be borne in mind that the stoppages in the tar valves and main are in a measure caused by pitch forced into the hydraulic when the dip-pipes are being cleaned; and this will naturally pass away easier through 6-inch valves and a 9-inch main. In the one instance the speaker is aware of where large tar mains and valves have been erected—*i.e.*, Widnes—there has never been a stopped ascension-pipe, nor has it been necessary to remove any pipe covers during nine months' working.

Mr. Kendrick had referred to the weight of the charge put in. In the writer's opinion, this was largely a matter of local conditions; and where the question of high yield per ton was concerned, the heavier charge with long-hour period was the best. In a small plant, however, the advantages of a heavy charge and long period are not so apparent. Tests at Ormskirk have proved that it is possible to maintain a more even quality of gas, with better fuel results, when burning off 7 cwt. in nine-hour charges than when burning off 8½ cwt. in the same period. Further, it was not necessary to work at such high heats, and there was, consequently, much less wear and tear upon the retorts, which is a very important item in small works. The total weight carbonized per retort per diem was 21 cwt., which has been found to be the most economical charge for the size of the retort, having regard to quality, yield per ton, fuel results, and wear on settings. In reply to Mr. Kendrick's question with regard to the price of the stoking machine, the full market price was paid for this; so that it could not be said that the capital charges were low on that account.

Mr. Smith had expressed the opinion that the heavier the charge the better results obtained, on account of the saving in wages and working costs. It is not possible, however, in any horizontal retort-house to have less than two men per shift; so that the more frequent charges necessitated by the lighter charge at the shorter period do not make any material difference, at all events during the greater portion of the year, so far as labour charges are concerned. The weight must be governed to a certain extent by local conditions. There is, however, an economic limit for any size of retort, beyond which it is not possible to go.

The difference in the wages per ton at Colwyn Bay and Ormskirk is for the most part due to the higher wages at the latter place. Mr. Smith stated that the Guest-Gibbons machine at Colwyn Bay had been adopted specially on account of its silentness and dustlessness. These conditions apply in perhaps a greater measure to the Fiddes-Aldridge machine, especially as the charging and discharging are done in one operation; and as the operation is very rapid, the escape of crude gas during the period of charge is very small.

In reply to Mr. Davies, the speaker stated that the quality of the coke was greatly superior to that obtained from some of the coals with hand stoking. Further, the percentage of breeze was low—being only 2 per cent.

The President in his remarks compared the results at Ormskirk with those obtained from the vertical retorts at the Droylsden station. This is not a fair comparison, as the Droylsden station is working in conjunction with the other stations of the Manchester Corporation, and in consequence the installation is not saddled with the conditions and costs that it would have to meet were it like the Ormskirk plant—solely for the supply of a small town. That is to say, whatever portion of the Droylsden installation is at work, it is worked to its full capacity, which would not be possible were it not working in conjunction with other gas-works. The same conditions apply to Nelson, where I believe the variations in the supply are met for the most part by the smaller horizontal retort units. In comparing the results, allowance must be made for the better quality of material carbonized at Droylsden, 18 per cent. of which was cannel and benzol. Further, the average calorific value was 560 B.Th.U., as compared with 600 B.Th.U. at Ormskirk; so that the extra make of 1200 cubic feet per ton at Droylsden is accounted for in these items. It is, however, on the figure of coke sold that the margin is so very great in favour of horizontals with stoking machinery. The figures of coke sold for the year were:

Ormskirk	11·92 cwt. per ton of coal
Droylsden	9·42 " " " " "

—both exclusive of that used on works. This difference of 2½ cwt., with coke at 10s., amounts to 1s. 3d. per ton, or (say) 1·14d. per 1000 cubic feet. The President claimed special advantages on account of the coke being dry. It must, however, be borne in mind that the coke is stored in the open, and in consequence must take up a considerable amount of moisture, varying according to the weather, before being weighed-out of the works. The average percentage of moisture in the Ormskirk coke is 7 per cent.; and if samples were taken going out of the Droylsden works, it is doubtful whether the percentage of moisture would be much less than this.

Allowing, however, for the Droylsden make of coke being perfectly dry, and deducting the percentage of moisture from the coke sold per ton at Ormskirk, there is still 1·6 cwt., or (say) 9·6d. per ton of coal in favour of the horizontals with stoking machinery as employed there. On the question of wages at Ormskirk, this works out at 1·01d. per 1000 cubic feet. If, however, eight-hour shifts were worked, instead of twelve-hour shifts as at present, the amount of wages paid per shift would be reduced, and the wages would amount to 1·6d. per 1000 cubic feet, and not 2·05d., as stated by the President, who allowed for the same wages being paid for eight-hour shifts as for twelve. The difference therefore between the Droysden and Ormskirk installations per 1000 cubic feet is actually 0·1d., and corrected for eight-hour shifts 0·7d. The difference in coke sold, however, is 1·4d. It is useless to apply the argument of dry coke, as it does not at the present time bring any higher price in the market; and it is obviously unfair to make allowance in the working costs for dry coke, at any rate until such time as the public are induced to pay more for it.

With regard to the calorific value, it has been found an easy matter to maintain an even quality, as is shown on the chart (which was exhibited at the meeting) from the recording calorimeter, which in ten days' working does not show a total variation of more than 30 B.Th.U. on the gas going out of the works. The working conditions in the retort-house are very good, and certainly in the summer time better than the vertical retorts, where the men have to stand an almost insufferable heat when working on the top. There has been practically no naphthalene trouble during the eighteen months the installation has been at work, with the exception of a slight deposit recently at the inlet of the gasholder. The absence of naphthalene is doubtless due to the regular and even charging. The President queried the figures put forward giving the calorific value and composition of the gas. A permanent record of the calorific value is made by means of a Simmance-Abady recording calorimeter, and this is checked by daily tests made on the total heat calorimeter. Frequent analyses are also made of the gas, and the coke is tested weekly for volatile matter and moisture.

In the discussion the figures given in the paper have been compared for the most part with results obtained in larger undertakings. The writer has recently had before him the results from a large modern horizontal installation which far exceed, so far as the net cost is concerned, any results that have yet been obtained from vertical retorts.

On the question of thermal value as a basis for comparing results, it will I think be generally admitted that from a given coal the quantity of gas produced varies as the quantity, so that in comparing the yield of gas per ton some reference must be made to the quality. Therefore with a known quality of coal, the thermal units per ton would give a better idea of the results from a carbonizing point of view. In other words, it would immediately show whether carbonization was complete or incomplete. For instance, it is the writer's contention that, so far as yield per ton is concerned, a works producing 12,000 cubic feet of gas at 600 B.Th.U., or (say) 7,200,000 B.Th.U. per ton, was obtaining better results than a works producing 13,000 cubic feet per ton of 540 B.Th.U., or 7,020,000 B.Th.U. per ton from the same coal. The comparison on thermal value does not, however, get away from the ever-present difficulty of varying quality of coal. It is, however, undoubtedly the fairest basis of comparison given (there or thereabouts) the same coal; and for this reason costs per million thermal units in conjunction with cost per 1000 cubic feet give a better idea as to the actual commercial value that is being obtained from a gas consumer's point of view as well as from the gas-maker's.

The Calorific Standard.—In the course of some notes on the progress of the calorific standard, "The Times," in their Engineering Supplement last Friday, said: "The gas industry in general, and the Gas Light and Coke Company in particular, have been breathing with considerably greater freedom since hearing the decision arrived at by the Select Committee of the House of Lords deputed to look into the relative merits of judging the value of gas on the basis of calorific or illuminating power. The nature of the ultimate finding was never much in doubt; but a somewhat formidable opposition—claiming to represent the interests of consumers—lost few opportunities of enlarging upon the dangers likely to follow the abolition of the now antiquated candle-power penalty. In view of the Committee's decision, however, this opposition may be said to have considerably strengthened the case for universally introducing a more modern standard of judgment. . . . Whatever effect the Committee's findings may have on the future control of carbonization, they appear likely at any rate to stimulate the demand for the vertical retort, with its continuous and consistent gas output."

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

Half-Yearly Meeting at Cardiff.

It has been customary to experience a good muster of members when the Institution visit Cardiff—which, thanks to the kindly sympathy of the Directors of the Gas Company, happens fairly often; and last Wednesday's gathering there proved no exception to the rule. A period of eighteen months had elapsed since the members last met in the city—a brief space of time from many points of view, but not in the history of the Gas Company. In a year-and-a-half much is accomplished in Cardiff; and all those who determined to be present at the meeting last week were confident that they would see something new during the visits to the show-rooms and the Grangetown works. They knew also from past experience that their welcome would be of the most cordial nature—that by their words, and by their deeds, the Chairman and Directors and the officials of the Company would prove that they were really pleased to see them. In no respect did disappointment await the members. In their generous hospitality, and their determination to assist them as far as possible in the acquisition of that greater knowledge of the industry which they are always seeking, the Gas Company acted fully up to the high standard which they had previously set themselves. In fact, from the Company came the President (Mr. H. D. Madden), the meeting-room, the luncheon, and even the author of the paper that was read and discussed—Mr. E. H. Clarry, who has acquired experience at the Grangetown works as a pupil of Mr. Madden. By the way, we believe this paper was somewhat in the nature of an innovation for the Institution—it being the first occasion on which a junior has come forward in this way. Judging from this contribution, the Institution will be justified in expecting great things of its juniors. One thing especially that was keenly appreciated by all was the presence with the members practically throughout the day of the Chairman of the Company (Colonel H. Oakden Fisher) and members of the Board; while the Secretary and General Manager (Mr. George Clarry) also devoted himself whole-heartedly to looking after the comfort of the visitors.

THE BUSINESS MEETING.

The business portion of the proceedings was transacted in the Gas Company's Offices in Bute Terrace, which had been placed at the disposal of the Institution for the meeting. The chair was occupied by the President (Mr. H. D. Madden, the Engineer to the Cardiff Gas Company); and among those present were Colonel H. Oakden Fisher (the Chairman of the Company), Mr. J. P. Ingledew (a Director), Mr. George Clarry (the Secretary and General Manager), and Mr. W. M. Mason (the Secretary of the British Commercial Gas Association). There were over forty members present at the opening of the meeting.

A Welcome.

Colonel Fisher remarked that he need hardly say it was with great pleasure that, on behalf of himself and his co-Directors, he welcomed the Association to Cardiff—more particularly as he saw they had been good enough to bestow the honour of President on the Cardiff Gas Company's Engineer, Mr. Madden. No doubt the members had a great deal to do, and they would not expect him to say much. He was sure their deliberations and discussions would be advantageous, not only to themselves, but to the gas industry generally. Really he had great faith in these meetings, as they enabled the members to express their views on different matters; and any dissemination of knowledge in this way must prove very beneficial all round. It was a pleasure to him to see that one of the "young bloods," if he might say so, of his acquaintance—was going to read a paper. He could only say if Mr. Ernest Clarry would follow in the footsteps of his highly capable father, he would become a very eminent engineer in the gas profession.

The President said that, on behalf of the Institution, he desired to thank the Chairman very heartily for his kind welcome. It was always a great pleasure to them as an Institution to visit Cardiff; and already on several memorable occasions they had done so. The Institution stood to-day stronger numerically and in every other way than they did on the occasion of their last visit; and they owed this in a great measure to the Chairman, Directors, and General Manager of the Cardiff Gas Company, who had done so much to foster a good spirit in the Institution. As they were all aware, in the inaugural stages of the Institution it had primarily for its object the discussing of technical papers; but since then the basis had been considerably broadened, and to-day there was even more work done in other directions—such as the commercial side—than in the reading of papers at their meetings.

Minutes of the Last Meeting.—Apologies.

The Hon. Secretary (Mr. Octavius Thomas, of Pentre) then read the minutes of the last general meeting; and they were confirmed. He also announced that he had received letters from Mr. Edward Allen (the President of the Institution of Gas Engineers) and from the Presidents of various District Associations regretting their inability to be present at the meeting. Alderman Thomas Canning, of Newport, also wrote saying he did not feel well enough to attend.

New Members and a Transfer.

On the proposition of Mr. L. J. Langford (Abertillery), seconded by Mr. J. E. Kenshole (Merthyr Tydfil), the following new members were elected: Mr. Thomas Wilkinson, of Abercarn; and Mr. Frank Boardman, of Grangetown, Cardiff. Mr. D. J. Branson, of Caerphilly, was transferred from the class of student to that of member.

Annual Report and Accounts.

The Hon. Secretary next read the annual report of the Council, which stated that during the year six members and three students had joined the Institution. One had died, and two resigned, leaving the number seventy at the end of the year. The receipts for the year amounted to £34 8s. 6d., and the payments to £31 1s. 3d., leaving, with the balance of £28 17s. 10d. brought forward from last year, the sum of £32 5s. 1d. in the hands of the Treasurer. Copies of the "Reports of District Associations" for 1913 have been sent to all members who have paid their subscriptions.

The report was adopted, on the motion of Mr. A. W. Branson (Caerphilly), seconded by Mr. Evan Rees (Margam).

Election of Office-Bearers.

The following were the officers elected for the ensuing year:

President.—Mr. A. W. Branson, of Caerphilly.
Senior Vice-President.—Mr. J. E. Kenshole, of Merthyr Tydfil.
Junior Vice-President.—Mr. A. J. Ward, of Cardiff.
New Members of Council.—Mr. R. J. Clarry, of Swansea; Mr. J. Robb, of Chepstow; and Mr. A. J. Bond, of Aberavon.
Hon. Treasurer.—Mr. Henry Morley, of Teignmouth.
Hon. Secretary.—Mr. Octavius Thomas, of Pentre.
Hon. Auditors.—Messrs. Boucher and Davies.

The President, in proposing the election of Mr. Branson as President, said that he was so well known to the members that no words were needed to recommend him. They were aware of his work in the gas profession; and from his paper at the recent British Commercial Gas Association Conference at Newport, they would have recognized that he was thoroughly practical and progressive. It would be a great gain to the Institution if he would consent to act as President.

Mr. E. H. Swain (Pontypridd) seconded the proposal, which was heartily carried.

Mr. Branson briefly returned thanks.

Subscription to the Gas Institution Benevolent Fund.

The President said he did not think that any remarks from the Council were required to commend to the kind consideration of the members the Benevolent Fund of the Institution of Gas Engineers. Many of them were personal subscribers; but as an Institution they had annually made a grant for some years.

Mr. Kenshole proposed that a sum of not less than two guineas be subscribed on this occasion.

The Hon. Secretary seconded this, and at the same time appealed to the members to send on individual subscriptions.

The proposal was agreed to.

Col. Fisher (with his co-Director) at this point left the meeting; remarking as he did so that he hoped shortly to see the members seated round a different table, with something more substantial before them—and all, he promised, prepared by the aid of that very useful article coal gas.

Some Notes on Wet Purification.

Mr. E. H. Clarry (Cardiff) then read a paper entitled "Some Notes on Wet Purification;" and this, together with a report of the long and interesting discussion to which it gave rise, will be found on p. 651.

Mr. J. H. Canning (Newport) proposed a hearty vote of thanks to the author, coupling with it the name of the President, Mr.

Madden, for affording the members the opportunity of learning the results obtained with the plant so admirably laid out by him.

Mr. KENSHOLE seconded the proposition, which was cordially passed.

Mr. CLARRY, in acknowledgment, said Mr. Madden had been a great help to him all through. It was Mr. Madden's idea; and he had only carried out his instructions. He desired to thank him, for allowing these notes to be put before the meeting.

THE COMMERCIAL SIDE.

The PRESIDENT pointed out that they had with them Mr. Mason, of the British Commercial Gas Association; and he was sure they would like to hear a few words from him.

Mr. W. M. MASON said that, while listening to the paper and the discussion, the question had crossed his mind, "Does not this absolutely bear out what we have been trying to say for the last three years, that on the engineering and scientific side—the technical side—the industry is splendidly represented?" Here was a body of gentlemen who were able and willing to put the necessary time and thought into a subject like this; but these same gentlemen, if he might be bold enough to say it, did not give the proper thought, or the time, or the money to considering that equally great side of the industry—the salesmanship side. They heard all round about electric power, and various other kinds of power; but in this section of a great industry there was a power they did not know about, or if they did know about it, they did not put it to the use to which it should be put. He referred to the power of the Press—the power of the printed word. In another paper which was to have been read to them that day on the salesmanship side, reference was made to canvassing, and to many points is salesmanship; but did the members really understand and value these things as they should be understood and valued? It was just as important that they should be able to sell the gas as that they should be able to make it in the admirable manner in which they did. He only wished he could report that since the last meeting a very large number of undertakings had come into the British Commercial Association. Unfortunately, this was not the case, though there had been some additions. He was delighted to be present at the meeting.

A FEW NOTES ON GAS SALES.

The PRESIDENT said they had had so many interesting matters to discuss, that no time remained for the consideration of the "Few Notes on Gas Sales" which had been prepared by Mr. Jackson, and which will be published later on. He asked the author if he would be good enough to assent to the postponing of the reading of it until the September meeting.

Mr. W. C. JACKSON (Merthyr Tydfil) agreed to this course.

A VOTE OF THANKS.

Mr. T. E. FRANKLIN (Barry) proposed a hearty vote of thanks to the Chairman and Directors of the Cardiff Gas Company for again allowing the members the use of their offices and so generously entertaining them. It was exceedingly interesting to come to Cardiff; and it happened to be a very convenient centre. It was extremely kind of the Directors to entertain them so often.

Mr. A. J. WARD (Cardiff) seconded the vote, which was carried with applause.

PLACE OF NEXT MEETING.

Mr. BRANSON asked that it should be left to the Council to make the best arrangements possible for the next meeting; and this was agreed to.

THE LUNCHEON.

This concluded the business; and the members were then invited to the Board Room, where they were the guests at luncheon of the Chairman and Directors of the Cardiff Gas Company. Colonel FISHER presided; and he was supported by Mr. C. E. Dovey (the Deputy-Chairman) and Mr. Morgan Lewis and Mr. Laurence Williams (Directors).

The CHAIRMAN, after the Loyal Toast had been duly honoured, proposed—"The Wales and Monmouthshire District Institution of Gas Engineers and Managers." He reiterated what he had said earlier—that he was only too pleased to see the members there, because he believed the result of deliberations such as theirs must prove beneficial, not to them alone, but to the gas industry as a whole. They were in a peculiar position, he thought, in South Wales—he was speaking, not as a gas engineer, but as a "humble director"—as compared with many other districts, inasmuch as they were not in what might be called a gas-coal producing district. Therefore it was often very difficult for the engineers to obtain those results which they all wished for. He was hoping that by such meetings as they had had that day, the experience of those who had tried various classes of coal would be brought forward, which would be an advantage to the other engineers. Really there were plenty of matters to discuss. He understood, for example, that purification was a very important subject just now. The fact that all their time that day had been occupied in discussing the first paper was sufficient proof that it must have been a very interesting one. He had by his side Mr. Mason, who represented the British Commercial Gas Association. They all welcomed him; and if there were any gentlemen present representing undertakings, whether belonging to companies or local authorities, who did not happen to be members of that Association, he hoped the words they would hear from Mr. Mason would convince them that it was to their advantage to join. The four Companies he (the speaker) was connected with were all members of the Association; and he would like to see that the whole of Wales realized that it was to their advantage to fall into line. It was a great pleasure to him that the Institution had found their President to succeed Mr. Madden in another of his Gas Managers—Mr. Branson. He sometimes had a tussle with that gentleman on various points; but he had had experience of Mr. Branson for some years now, and he unhesitatingly said they had made no mistake in electing him President. He assured them that anything the Cardiff Gas Company could do to forward the interests of the industry was done with pleasure. With the toast he coupled the name of Mr. Branson.

Mr. A. W. BRANSON, in response, said they all appreciated very much the toast which had just been given, and the hospitality extended to them. They were in Cardiff as the guests of the Company so often that it might be thought their welcome would be becoming rather threadbare; but there was no evidence whatever of this to be found. One could hardly exaggerate what the Cardiff Gas Company meant to the Institution, who would have done very badly indeed without their help. The members were all learners; and the opportunities the Company had offered to inspect their works were very valuable. The membership of the Association was steadily increasing. It could never be a big family; but still it could be a united and important organization. In visiting the Cardiff Gas-Works, they were visiting the "university of gas" so far as South Wales was concerned; and he would like to congratulate the Board and the Company on the progressive example they set, not only to South Wales, but to the gas industry generally throughout the country. He would also congratulate the Company on their Chairman, who was always in the forefront of gas matters in South Wales. He was an old civil engineer, and had keen sympathy with gas engineers.

Mr. T. H. HAZELL (Newport) remarked that the Cardiff Gas Company was the premier institution of its kind in Wales; and it was a great satisfaction to the members to be gathered together once more at its hospitable board, with the genial Chairman of the Company at the head. One was always pleased to see Colonel Fisher; for, wherever he was, there they were assured of a warm welcome. He proposed "Health and Prosperity to the Cardiff Gas Company," who gave the lead in all things appertaining to the welfare and general advantage of the gas industry throughout Wales. They were indebted to the Chairman, Directors, and officials of the Company for this lead, which was so readily followed. The Company used their influence and efforts to advance the status of the industry; and they were at the same time always keenly alive to the welfare of the consumers they served. Gas people and the gas industry generally were undoubtedly benefactors to the community; and in spite of the different kinds of competition by which they were beset, the industry continued to prosper; and at an increasing rate. He believed it was the general experience that the rate of progress increased each year. He coupled with the toast the name of Mr. Dovey.

Mr. C. E. DOVEY (the Deputy-Chairman of the Company), on behalf of the Directors, thanked the visitors for the way in which they had alluded to them. The Company were very pleased to receive the Institution—especially as the President for the year was their Engineer. Mr. Madden was held in high esteem because of his excellent qualifications and good work. The Company felt that they did occupy a niche in the commercial activity of Cardiff. They desired to render complete service to their customers, to produce the best possible article, and to look after the shareholders and the employees. They were favoured with officers of the very highest standing; and it was their pleasure to support them in their efforts to meet all requirements in the fullest sense. He hoped before very long the Institution would visit them again.

The PRESIDENT proposed "The Visitors," and referred with special pleasure to the presence of Mr. Mason.

Mr. W. M. MASON, in reply, said he was present in the *rôle* of a recruiting sergeant. He was glad to hear the kind things the Chairman had said about the British Commercial Gas Association. It was a fact that the Association was not a charity organization, but a business proposition all through; and it was particularly gratifying to hear such things in Cardiff, the capital of Wales, and the possessor of one of the most progressive gas undertakings in the country. Ably backed-up by his Chairman and Directors, the Association had much for which to thank Mr. Clarry, who made an excellent representative. The Association stood for two great factors. It stood for co-operation. Their meeting together that day as gas engineers testified to the fact that they believed in co-operation. Indeed, the need for co-operation was so apparent that it should hardly need talking about. Therefore it seemed rather extraordinary that in Wales, with over 200 gas undertakings, only about 30 should have joined the Association. Of course, he quite believed the statement made lately at Newport—that if it depended upon the managers they would all be members of the Association; and he would suggest again that if he could be of any assistance to them in laying the case before their directors, they should not hesitate to apply to him. There might be some information he could give which would enable them to put forward a better case for co-operation. In addition to co-operation, the Association stood for progress. Like a nation or a community, a gas undertaking could not stand still. A concern that did not try to progress, but remained satisfied with its position, would probably meet with competition and strenuous times; and so, instead of standing still it would go back. Undertakings that wished to progress should join the Association.

The CHAIRMAN proposed the health of Mr. Clarry; remarking that that gentleman had been mainly responsible for the day's arrangements. Mr. Clarry should be proud to have two sons following in his footsteps.

Mr. CLARRY, in response, said he quite agreed that meetings of this character were calculated to advance their interests and improve the position of their respective undertakings. It was absolutely necessary for them to be up and doing; and they must also keep their eyes closely fixed on what was happening around them. Only the other day there was a very striking and far-reaching decision given which would affect all companies where electrical competition was in force. They had to meet points of competition which would inevitably tend to their disadvantage if they were not scotched in good time.

AT QUEEN STREET AND GRANGETOWN.

Luncheon over, motor-cars conveyed the party, under the charge of Mr. Clarry and Mr. Madden, first to the handsome

show-rooms of the Gas Company in Queen Street. Here there was plenty to see and to admire, for samples of everything that is most useful and ornamental are on view for the benefit of gas consumers. High-pressure outside lighting is in use on a large scale in Cardiff; and particularly is this the case in Queen Street itself. In all, there are to be found in the city considerably over six hundred lamps; but no display is more brilliant than that in front of the Gas Company's own show-rooms, where there are installed eight 1500-candle power Keith high-pressure silica lamps. An arrangement has been adopted (which we do not remember to have seen in use anywhere else, and which has proved extremely popular) to enable any person passing the premises after business hours to light up the inside of the front window, and so take note of the contents. In the window there is fixed an incandescent burner which is connected to a pneumatic lighter attached to the window-frame, and actuated from the outside. When the button is pressed, the gas supply is turned on; and the releasing of it automatically extinguishes the light. Among other things shown in the window is a hot-water circulator. This is in action; and the flow-and-return pipes are of glass, while the tank is fitted with a glass front. In this way people are able to follow the circulation of the water, and to see that boiling water is obtainable. Inside, there is a fitted up bath-room interior, and geysers and shower sprays, attached to the bath and to a lavatory basin, are shown in action; and in addition to an excellent assortment of fires, cookers, radiators, &c., there is a wide range of fittings and glassware, for both direct and semi-indirect lighting. A number of the fittings are already connected-up, controlled by distance lighters on the pneumatic and Telephos systems, so that prospective purchasers may see just what they are buying will look like when in use. If the progressiveness of a gas undertaking can be judged from its show-room—and there is no doubt that to a large extent this is the case—the shareholders in the Cardiff Gas Company, and the consumers, are to be congratulated. A word, too, must be spared for the samples displayed of pipe-bending, joint-making, and designing, carried out by the Company's gas-fitters' apprentices at the technical schools. Some of the advanced work was very well done indeed; and the more elaborate designs included a model aeroplane. There are two classes—elementary and advanced; and the boys are allowed to attend them in the Company's time.

Proceeding to the gas-works at Grangetown, the members inspected certain portions of the plant, to which attention was drawn in a pamphlet prepared for the occasion. First the sulphate house was taken; and general admiration was expressed at the well-kept appearance of all the plant, which comprises two sets, by the Chemical Engineering Company, each being capable of producing 4 tons of sulphate of ammonia per day. The saturators are of the closed type, and discharge the liquid sulphate into centrifugal drying machines, with bottom discharge, feeding directly into the sulphate store elevators. Both the liming and the sulphate discharge are automatic in action. In this, and in other parts of the works, there was ample evidence that those who have charge of the apparatus take pride in the condition in which it is kept. Next to be visited was the No. 2 retort-house, which contains forty settings, each of eight through retorts on the regenerative system; the stoking being carried out by means of compressed air. The original machines are West's rake drawers and scoop chargers; but a section of the house is now worked by the West patent power stoker, which charges and discharges in one operation. Welsh coal is being used; the duration of the charges being eight hours, and the weight 8½ cwt. The operation of discharging some of the retorts was witnessed; and it was noticed that the whole of the coke is removed by chain conveyors. These deliver into the outside storage and loading hoppers, which have a capacity of 400 tons. The working of the four purifying houses that are in action was explained; and it was pointed out that the newest house is fitted with luteless lids and Pickering centre-valves. The purifying material is elevated, conveyed, and delivered direct into the boxes; the spent material being discharged through bottom doors on to the revivifying floor.

Special interest was taken in the scrubber yards, in view of the paper which had been read by Mr. Clarry at the meeting earlier in the day. No. 1 yard was undergoing repairs; the work including the re-making of a cast-iron overhead liquor tank of a capacity of 30,000 gallons. Two additional Coleman cyclone extractors, each of 2½ million cubic feet capacity, are being added to this section of the plant. The newly completed No. 2 yard, which is of a capacity of 2½ million cubic feet a day, consists of a cyclone hot tar extractor, and combined atmospheric and water-cooled reversible condensers. The exhausting plant is steam driven and housed in the same building as the boosters, which pump gas from the holders to the governor inlets, and also to the Bute Terrace storage station. Washing is accomplished by a Livesey washer and two rotary washer-scrubbers; the latter being divided into four sections. The two 8 ft. 6 in. diameter double Lancashire boilers, with double flues, are in a house which has a firing-floor sunk 2 feet below ground level, to receive fuel from side-tipping railway waggons. The pump-house contains three pumps for dealing with tar and liquor; and over the building there is a cast-iron covered tank having a capacity of over 13,000 gallons. The tar and ammonia wells are of brick and puddle, with ferro-concrete roofs. The carburetted water-gas plant (which is in four sections, having a total producing capacity of 4 million cubic feet per day) is of a very complete type, with all the latest appliances for ensuring exactitude in operation. One of the features is the coke bunkerage. The coke is elevated and stored overhead along the top of the house—an arrangement which permits of at least thirty hours' fuel requirements for the generators being stored under cover. The generator loading bogies are fed by shoots delivering immediately over the weighing machines.

The visitors were also fortunate in seeing important new work in course of construction. On the old retort-house site, a vertical retort-house is being erected. The system adopted is the Glover-West; and when completed the capacity of this new section will be 2½ million cubic feet a day. The retorts and the inner linings of the settings will be made of silica. The power-house is also being built on part of the old retort-house site. In this, the electric power will be generated for driving the machinery for the plant. The coke will be handled by means of a telpher, which will convey it to the storage hoppers outside the power-house, or directly from the retorts to the carburetted water-gas plant and boilers. The work of constructing a new gasholder tank has also just been begun. This is to be of brick-and-puddle type, 180 feet in diameter by 33 feet deep, with a centre dumpling. The capacity of the holder will be slightly over 3 million cubic feet.

Recent additions to the works are a booster governor and a tar dehydration plant. The former is a 30-inch automatic quick-opening governor, fitted with two disc plate valves in equilibrium; and it is used in conjunction with the Rateau booster fans, and immediately adjoins the station governors. Tar dehydration is carried out in a plant capable of dealing with 4000 gallons per day, which is of the Chemical Engineering Company's type. A store for the dehydrated tar and light oils is provided for by two steel overhead tanks, erected on a steel superstructure immediately adjoining the plant, with pumps underneath. The crude tar is supplied from an overhead cast-iron tank carried by a building the interior of which will be utilized as a laboratory extension and employed solely for the purpose of testing all gases supplied to the district.

There is a coal testing plant comprising a setting of three retorts, with condensers, exhausters, holder, and photometer-room complete. Immediately adjoining is the laboratory, where complete analyses of all materials and gases are carried out. Additional coal, coke, and sample bins are in course of construction. The station covers a large amount of ground; but the work of supervision is facilitated by a complete telephone installation, by the aid of which all parts of the works can communicate with the Engineer's office or with one another.

After taking tea on the works, the members separated, well pleased with the day's proceedings.

The "Venturi" Principle Applied to Station Meters.

The firm of "George Kent, Limited," have just completed a new station-meter, 12 inches diameter, for the Grays and Tilbury Gas Company. The meter works on the "Venturi" principle, and is automatically density corrected; so that the results given are precisely similar to those of an ordinary station meter. The "Venturi" tube is already in position at Grays; and the recorder has just been completed at the firm's works, and will be immediately erected at Grays. The meter is entirely unlike that which the firm put up at Bromley some three years ago, and of which a description appeared in the "JOURNAL" at the time. It works, however, upon identical lines with the meter they made for the Luton Gas-Works, and which has been in operation for the past year. There is yet another meter of the same type being constructed for the Bilston Gas Company.

Metropolitan Water Board's New Offices.

The Metropolitan Water Board have selected the plans of Mr. F. Austin Hall for the new central offices to be erected in Rosebery Avenue. Mr. Hall is a member of the firm of Messrs. Warwick and Hall, who are known to "JOURNAL" readers as the architects for last year's National Gas Exhibition at Shepherd's Bush. The plans for the Water Board offices were chosen from among six designs by Mr. E. Guy Dawber, the Assessor appointed by the President of the Institute of British Architects; and they were subsequently found to be those of Mr. Hall. The designs submitted by the six competitors will be open to inspection by the public during this week, at the offices of the Board in Savoy Court, W.C. The Chairman of the General Purposes Committee (Mr. Vesey Fitzgerald) informed the Board that the Assessor had advised that, with care, buildings could be erected to the selected design at a cost of about £90,000. The Board authorized the General Purposes Committee to consider whether, for administrative purposes, any modification of the plans was expedient, and whether any saving in the estimated cost could be effected.

The late Mr. John Fowler, J.P., an Alderman of the Borough of Lichfield, four times Mayor of the town, and for many years a Director of the Lichfield Gas Company, left property valued for probate at £46,267.

The London and Southern District Junior Gas Association will pay a visit on Thursday afternoon to the Luton works and foundry of the Davis Gas-Stove Company. The various shops, &c., will be inspected; and there will be a demonstration of the "Shadowgraph" and other methods of testing the hygienic efficiency of gas-fires. Tea will afterwards be served.

SOME NOTES ON WET PURIFICATION.

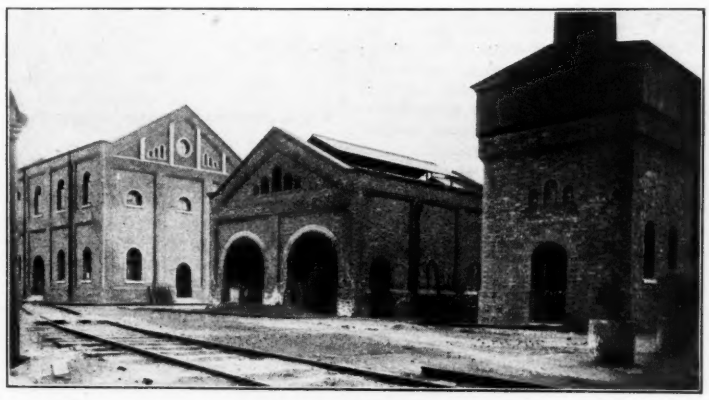
By Ernest Hornsby Clarry, of Cardiff.

[A Paper read before the Wales and Monmouthshire District Institution of Gas Engineers and Managers, May 27.]

The notes I have the pleasure to bring before you are not of any new or novel process, but bear upon the well-known subject of condensation, washing, and scrubbing practice, having reference to the treatment of gases and tars produced from mixed Welsh bituminous coals by the latest extension of condensing and washing apparatus at the Grangetown Gas-Works.

For the present a connection has been made to take the coal gas from the machine-stoked No. 2 retort-house, and another connecting main is being laid down so that crude gas from No. 1 retort-house (vertical section) can be treated. The connecting arrangements will then allow us to work the scrubber yards jointly or singly, in conjunction with either retort-house stream.

Before any definite detail was decided upon, a series of careful tests and investigations were made on the No. 1 yard to define where improvements might be made to deal with gas produced by high-heat carbonization. Particular attention was paid to the tars deposited in the condensing section of the apparatus, and also to the system of liquor supplies throughout the washers. The condensers on this section are of the annular type; and the washing plant consists of four tower scrubbers, filled with bundles, and two rotary mechanical washer-scrubbers.



General View of the Works.

The following particulars of our retort-house working, and the peculiarities of Welsh coals, may be of interest. The average heats in the retort-house were: In the combustion chamber, 1226° C. These heats were taken after the furnace had been filled with hot coke; therefore they may be a trifle low. In the retort-settings, 1000° C., with horizontal machine-stoked retorts, in beds of eight, with two ascension-pipes and 8 cwt. charges burned off in eight hours.

The coal, as already stated, was mixed Welsh—large, through, unwashed smalls, &c.; and an average analysis of same is appended, together with a few of its characteristics:—

Volatile.	Ash.	Sulphur.	Coke.	Breeze.	Tar.	Liquor.	Make.	C.P. No. 2 Met.	Cal. P. Total Heat.	Carb. Temp.
P.C. 21·54	P C. 13·6	P.C. 2·08	Cwt. 12·5	Cwt. 0·8	Galls. 7·4	Galls. 22·1	Cu. Ft. 10,864	14·02	B.Th.U. 600	°C. 1000

The site decided upon for our newly-constructed scrubber yards has been plotted to accommodate ultimately 5 million cubic feet per day. The plant just erected was designed as a No. 2 scrubber yard, to provide for extensions, and to treat an additional stream of coal gas equal to 2,500,000 cubic feet per diem, with further possible extensions hereafter. Previous to this period, the coal gas was condensed and washed in two streams, passing through the existing No. 1 yard; the latter being so congested that it did not lend itself to any further development.

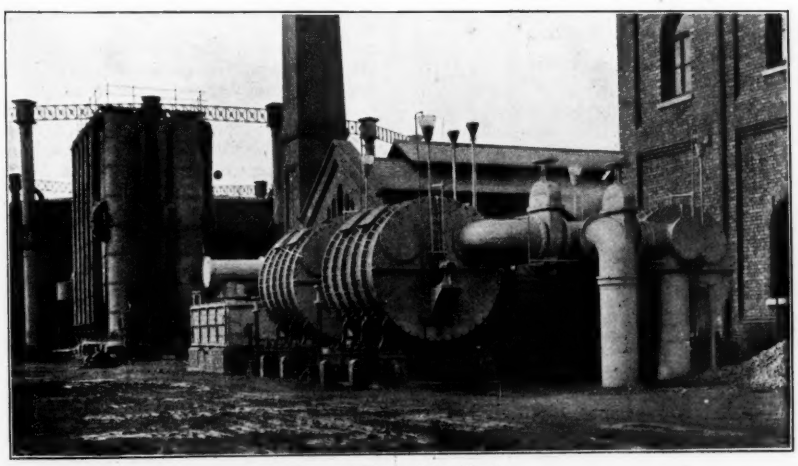
The following figures from tests made of ammoniacal liquor may prove of interest.

Date.	Place.	H_2S in Grains per Gall.	CO_2 in Grains per Gall.	Oz. Strength per Gall.	Specific Gravity.
Jan. 4 . .	Hydraulic main	9·80	118·07	3·8	1·008
	Liquor scrubber	126·15	1404·83	10·5	1·024
	Water ,,	101·34	737·02	5·2	1·012
Jan. 11 . .	Hydraulic main	32·45	317·52	4·4	1·008
	Liquor scrubber	177·02	194·29	11·7	1·028
	Water ,,	118·12	914·73	9·7	1·013
Jan. 23 . .	Hydraulic main	26·10	289·26	4·7	1·007
	Liquor scrubber	63·90	1466·13	10·5	1·026
	Water ,,	134·02	950·92	6·0	1·012
Average result	Hydraulic main	22·78	241·61	4·3	1·008
	Liquor scrubber	122·35	1604·62	10·9	1·026
	Water ,,	117·82	867·55	6·9	1·012

Tests on stream of gas through two tower scrubbers, working in series—one with circulated weak liquor, and one with water:

	Inlet.	Outlet.	Removed.
Grains of H_2S per 100 cubic feet .	830 ..	560 ..	270
,, ,, CO_2 ,, ,, .	2329 ..	1792 ..	537

The stream of gas was still further treated in the rotary machine, to effect removal of the last traces of ammonia.



General View of the Yard.

Effect of Scrubbers on the Liquor.

	Liquor Scrubber.	Water Scrubber.
H_2S in inlet liquor	22·78 grs. per gall.	*Nil* (pure water).
,, in outlet liquor	122·35 ,,	117·82 grs. per gall.
,, absorbed	99·57 ,,	117·82 ,,
CO_2 in inlet liquor	241·65 ,,	*Nil* (pure water).
,, in outlet liquor	1604·62 ,,	867·55 grs. per gall.
,, absorbed	1363 ,,	867·55 ,,

In the No. 1 yard, with the tower scrubbers, &c., we were continually pumping and circulating the liquors and moving the tars, thus militating against the formation of a good strong liquor, and never allowing the tars to properly settle, with consequent occlusion of a high percentage of water in the latter, to say nothing of the continual expense of labour, steam, and machinery, which we have endeavoured to obviate in the new yard.

The New Yard.

Following these investigations, the Directors finally approved of the following system being adopted. The crude gas, *ex* retort-house, passes through the apparatus in the following order: (1) Colman's cyclone tar-extractor; (2) condensers (annular); (3) exhausters; (4) Livesey washer; and (5) rotary brush washers (four sections). The objective in using the foregoing plant was:

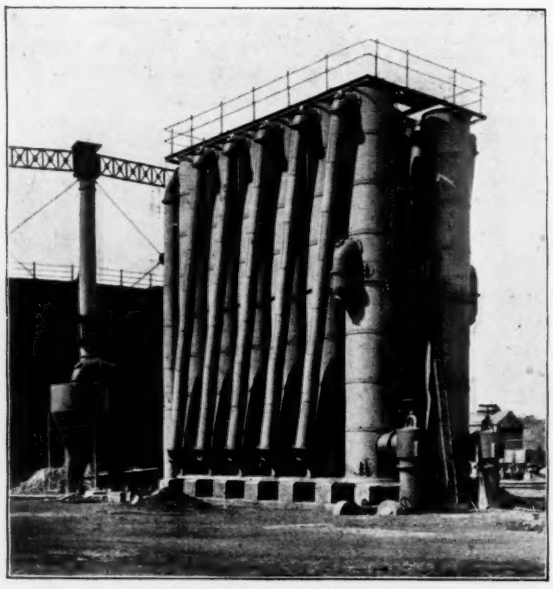
1.—Quick removal of the thick tar from the gas prior to condensation, leaving lighter tars only to go forward.
2.—Easy and efficient condensation to retain the greatest quantity of the calorific and candle power constituents.
3.—Entire removal of even the lighter tars before washing.
4.—The formation of strong ammoniacal liquor.
5.—Lessened exposure of ammoniacal liquor to the atmosphere, also reduced pumping.
6.—Retention of all available ammonia absorbed by the water.

With the previous knowledge of the tars produced, which were of a very thick nature, and contained a high percentage of water, it was decided to remove the heaviest at the earlier stages, while the gas was hot, immediately after leaving the retort-house. A Colman's cyclone tar-extractor, having a capacity of 2½ million cubic feet per day, receives the gas stream; the average inlet temperature of which is 110° Fahr.—the gas having first travelled through about 80 yards of foul main. The crude gas is subjected to a whirling motion in its passage through the cyclone; and the heavy tar fogs are reduced to liquid form, and flow away at the bottom to a visible seal-pot, and thence to the tar-well. The cyclone tar-extractor is, no doubt, familiar to most; one of its chief advantages being that it is self-acting, requiring no mechanical power or supervision. The quantity of tar passing away is most marked, and is removed immediately from contact with the gas at its own temperature of deposition; the outlet temperature of the gas from the cyclone being 104° Fahr.

Analysis of Cyclone Tar taken from Seal-Pot.

	First.	Second.
Specific gravity	1·212	—
Water	10%	14%
Light oils up to 170° C.	1·88	Trace
Middle oils up to 270° C.	23·92	15·2
Heavy oils up to 350° C.	10·82	9·4
Pitch	65·00	75·4
Naphthalene	8·00	4·98
Free carbon	10·40	—

The first sample was taken in January, during a fortnight's trial run, when it was very cold, which will, no doubt, account for the rather high percentage of light oils.



The Cyclone and Condenser.

The Condensers.

The condensers are of the annular type, grouped in two lines, with an overhead platform for the operation of the air-controlling valves, which can be regulated to suit any atmospheric condition. The last two tubes are fitted with a series of vertical circulating water-pipes to effectually reduce the temperature in extremely hot weather. However, owing to the grouping and overhead platform, a large proportion of the tubes are always in the shade. The connections have been arranged so that reversible condensation can be attained, and also that the series may be worked either individually or in parallel; the objective being to remove the thick and heavy tars from undue contact with the gas, so preventing these tars, on cooling, from soaking up too large a percentage of the light oily hydrocarbons from the gas—these being extremely desirable and valuable from the illuminating and calorific standpoints of the finished gas.

Key to Position of Condenser Seal-Pots. Condensers Work in Parallel.

The whole was designed to provide for the utmost frictional treatment of the gas during travel; the products of condensation being removed directly from contact with the gas from the base of each tube at their own temperature of deposition by suitable seal-pots and pipes. The importance and reason for this is that tars on cooling reject naphthalene vapours, which are again absorbed by the gas.

All valves are visible, and marked by an indicator "Open" and "Shut." Each tube and seal-pot is provided with suitable hand-holes and removable covering plates, for easy access for cleaning purposes. The object of putting the cyclone before the condensers was, of course, to get rid of the thick, heavy tars, and so allow a cleaner condensing surface for the gas.

The condensed products from the condenser consisted of good, clear liquor, slightly red, but otherwise transparent. The following is an analysis of it:—

—	1 A.	1 B.	2 A.	2 B.	3 A.	3 B.
Oz. strength	22·6	20·0	19·4	17·0	17·0	16·0
H_2S, grs. per gallon	956·65	1007	1484·6	1679·04	1568·8	1620·2
CO_2, grs. per gallon	243·2	170·4	168	112	132·4	126·4

It will be noted that the strongest liquor formed is from the coolest end of the condensers. Conversely, the H_2S in grains per gallon is greater at the inlet; the CO_2 absorption being greater at the outlet.

While removing the thickest tar at the earliest possible stage, we had to take into consideration the very small percentage of light oils and tars from local coals. Therefore a slight "slip" was tried and given to the cyclone. After working with the cyclone first in series, a deposition taken from the condensing tubes was tested, and it gave the following results; naphthalene being a dominant constituent:

	Per Cent.
Water	16
Light oils	0·3
Middle oils	31·5
Heavy oils	8·9
Pitch	43·3
Naphthalene	29·34
Free carbon	19·65
Mineral matter	0·60

It will be noticed that a great deal of the naphthalene is deposited, which confirms the principle already indicated. As an extra precaution in winter time—when the condensation, despite care and the provision of butterfly valves, &c., is inclined to be exceptional, with possible ensuing stoppages—a flushing arrangement, consisting of a 2-inch pipe, has been run up to the top of the condensers, and connected in two places inside each tube; so that periodically either liquor or oil-gas tar can be pumped in, and so clear the passage ways. The condensers themselves, I may mention, have ample cooling surface. They were so designed as to permit of slow and gradual condensation, with the ultimate object of nursing the nascent gas—thus reducing to a minimum undue shock, which, of course, would have a prejudicial effect upon the calorific and illuminating constituents, which it is so necessary to conserve in the gas, instead of being deposited in the tar-wells in the form of light oily tars.

Ammonia Recovery.

This process is effected by means of the affinity of water for ammonia, which at normal temperature and pressure, is capable of absorbing 700 times its own volume of the alkali. This, of course, would be correct if we were dealing with ammonia alone; but we are dealing with coal gas, which has about 480 grains per 100 cubic feet, or 1·5 per cent. Therefore the pressure exerted by the ammonia is greatly reduced from the theoretical; and by the time the gas has been through the condensing plant only about 0·7 per cent. by volume is left for the washing and scrub-

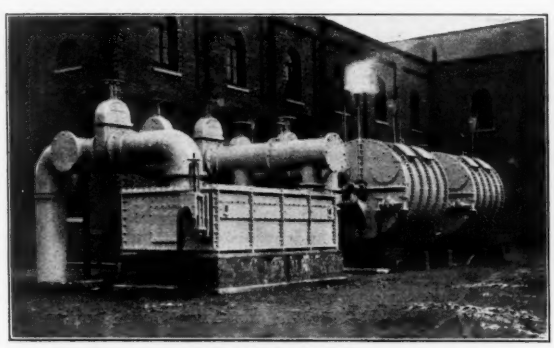
bing plant to eliminate. Naturally, every one aims at taking the fullest advantage of the affinity that the basic ammonia has for the acid radicals H_2S and CO_2, because the more there is taken out in this part of the purifying plant the less the purifiers will have to do.

Approximately one-fourth of the total ammonia in the gas liquor is fixed—that is to say, ammonia in combination with certain acids, which needs boiling with some alkali before the ammonia is liberated. It chiefly consists of ammonium chloride, ferro and sulpho cyanides, and complex carbonates and sulphates, and when formed is of no use for extracting the H_2S and CO_2. Therefore, it will be noted that the percentage of available ammonia is again greatly reduced—being, in fact, about 0·14 per cent.—and the impurities to be extracted total up to 3 and 4 per cent.; so it is impossible to extract them all.

The best chemical action to be aimed at is, in the case of carbonic acid, to form ammonium carbonate, and with H_2S to form ammonium hydrosulphide; both cases only taking one molecule of NH_3 to achieve practically the same end, and therefore conserving the NH_3. But, unfortunately, this is almost impossible, as we have little or no control over the chemical actions taking place inside the washers; and such a great deal depends upon the composition of the gas itself.

The Livesey Washer.

The gas leaving the condensers passes through the usual exhausters, forward into the well-known Livesey washer. The arrangement and working of this piece of plant are quite familiar; the idea, as you are probably aware, being to wire-draw the gas, or, in other words, bubble it through a light seal of water in minute streams. To achieve this, the gas passes into a series of



The Washer Section.

rectangular troughs, perforated at the bottom; the perforations being under water or ammoniacal liquor, which is constantly flowing through. This type of washer is most necessary to prepare the gas for the washer-scrubbers, as it removes any floating particles of light tar vapours not previously eliminated, to prevent them going forward to the rotary washers and clogging the brushes, and so impairing their efficiency. It also extracts a little NH_3, CO_2, and H_2S, as the following figures show:—

H_2S, CO_2, NH_3, and CN removed from Gas in Livesey Washer.

	Inlet Livesey. Grains per 100 Cub. Ft.	Outlet Livesey. Grains per 100 Cub. Ft.	Quantity Extracted. Grains per 100 Cub. Ft.
H_2S	751·4	604·7	46·7
CO_2	2,500·0	2,190 0	310·0
NH_3	178·4	131·1	47·3
CN as HCN	28·78	28·37	0·45
Ammoniacal liquor	14·2 oz.	16·6 oz.	—

Test of Tar Removed by Livesey Washer.

This sample was taken from the seal-pot overflow-pipe, which it had choked up. On being removed it was solidified, but on warming liquefied, and remained so. The reason for solidification was a sudden chilling.

	Per Cent.
Water	2

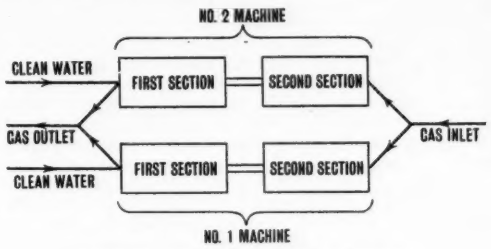
Percentage by Weight.

Light oils	3·3
Middle oils	28·3
Heavy oils	8·3
Pitch	60·6
Naphthalene	8·46
Mineral matter	5·0
Free carbon	4·3

Washer Scrubbers.

The washing plant adopted is of the horizontal rotary brush type. The two washers are divided into four complete sections, any section of which can be shut out. The whole can be driven from a central position by means of steam-engines, shafting, and couplings, so arranged that either of the four sections can be shut out by means of clutch couplings. Series or parallel working may be employed to deal with the stream of gas coming from the Livesey washer. The water supply is admitted on the gas-outlet end of the washers, and is governed by quadrant cocks. To obtain working data, a water-meter has been fitted, and regular observations taken as to the quantity of water required to keep the outlet gas entirely free from ammonia.

Once admitted into the washers, the water gravitates forward, flowing in the opposite direction to the gas in the usual way, and is delivered into the Livesey washer.



Key to General Arrangement of Washers.

From clear water, during the conversion to ammoniacal liquor of from 14 to 16 oz. strength, no pumping is resorted to; and the liquor is not at any point exposed to the atmosphere until leaving the sunk and covered seal-pot on the Livesey washer, whence the liquor flows direct into a tightly-covered underground tank.

Before starting the plant everything is sealed, and the washers slightly overflowing; each chamber being full of water, and overflowing from chamber to chamber through holes in the cast-iron plates placed at slightly decreasing levels, to allow the water to flow by gravity through the plant, and so through the Livesey washer and into the storage-well. The revolving brushes, dipping into the water and liquor, constantly supply freshly wetted surfaces to the gas, which has to pass through all these wetted brushes before reaching the outlet. No tar should be present. Therefore, the brushes should not clog, and only require cleaning very rarely.

Suitable drain-pots, connections, and cocks are provided to run off any slight accumulation of tar periodically into a long trough, and thence to the seal-pot. Separate liquor take-offs are provided in each bay of each unit, so that quick and easy examination of the liquor—say, by a Twaddel hydrometer—can be made, and the water at the inlet regulated accordingly. Gas-cocks are also placed in each unit, from which turmeric paper tests are repeatedly taken. All pipes and valves are above ground, and easily accessible. This is a very efficient piece of plant, both as an ordinary washer, and also for working up the liquor.

Series of Tests on the Liquor.

Section.	No. 1 Rotary Brush Machine.			No. 2 Rotary Brush Machine.		
	NH_3.	H_2S.	CO_2.	NH_3.	H_2S.	CO_2.
First	6·269 oz. strength	49 grs. in 100 c. ft.	2 grs. in 100 c. ft.	4·31 oz. strength	122·8 grs. in 100 c. ft.	18 grs. in 100 c. ft.
Second	15·5 ditto	755·25 ditto	18 ditto	14·2 ditto	214·65 ditto	63·6 ditto

NH_3, CO_2, H_2S, and HCN in Gas Passing through Rotary Washer.

—	Inlet. Grains Per 100 Cubic Feet.	Outlet. Grains Per 100 Cubic Feet.	Quantity Absorbed by Liquor. Grains Per 100 Cubic Feet.
NH_3	131·1	*Nil*	131·1
H_2S	604·7	548·3	56·4
CO_2	2190	1608	582
HCN	28·33	25·71	2·62

It will be noted that only a comparatively small amount of H_2S has been absorbed. This is evidently due to the large amount of CO_2 to be dealt with, which acts as a displacer. Improved results will, no doubt, be obtained when the plant is better understood. The quantity of water passing through during the cold weather averaged about 10 gallons per ton of coal carbonized, and during the warm weather double this quantity; and about 24 gallons of 10-oz. liquor are produced per ton. Throughout the whole of the plant the ammoniacal liquor is kept out of contact with the air as much as possible, reducing to a minimum the loss of free NH_3.

The finished liquors and tars drain by gravity into their respective receiving wells, both made of brick and puddle, and covered with reinforced concrete roofs, having tight-fitting manhole lids. The liquor is covered over with a thin layer of light oily tar, which is derived from the action of the Livesey washer, and would seem to seal the NH_3 in the liquor.

The seal-pots and overflows from the cyclone, foul main, &c., are grouped in a sunk pit; their overflow-pipes passing through a curtain wall, delivering the condensates into a sealed well. The advantage gained is that the pots are readily accessible by the attendants, without the discomfort of ammonia vapours from the body of the well. It also removes a rather ungainly sight.

The liquor is pumped up into an overhead tank of 13,200 gallons capacity, built up on top of the pump-house. From there it flows

by gravity to the Company's sulphate-works. The tar is also pumped up into an overhead cast-iron tank (erected on a building which will form a new laboratory), of 17,000 gallons capacity, whence it gravitates to the adjacent tar dehydration plant and railway loading stand-pipe. The boiler-house supplying the steam for the pumping and washer-scrubbers, and also the exhausters, is very central to every piece of plant in the yard.

In concluding, the writer thinks that, though condensing, washing, and scrubbing is routine work, yet this branch of purification will, in quite the near future, receive greater attention than heretofore.

In setting out the new section of the plant, Mr. H. D. Madden, my chief, aimed at obviating the inefficiencies incidental to existing plants, and at the same time endeavoured to increase the efficiency and general working of the new scrubber yard. To determine to what extent the new section would accomplish this, its early working was carefully watched, and a large number of tests were made; and although perhaps some items are not fully substantiated (the plant having only recently been put into action), progress will, without doubt, be made as further knowledge is gained by daily contact and supervision.

DISCUSSION.

The PRESIDENT (Mr. H. D. Madden, of Cardiff) remarked that, before inviting discussion on the paper, he would like to say how glad they all were to have induced an assistant to come forward and read a paper. He believed it was the first time that this had happened in the history of the Institution; but he hoped it would not be the last. There was a lot of personal work done by assistants on the staff; and it was frequently interesting.

Mr. J. H. CANNING (Newport) complimented Mr. Clarry—as did also succeeding the speakers—on having come forward and given them so excellent a paper, and one which showed that he had taken infinite pains to investigate the subject. Incidentally, he had furnished them with some extremely useful figures. He would like to endorse what the President had said—that it was gratifying to see a junior member of the Association come forward and submit such a valuable paper. The paper had been of particular interest to him (Mr. Canning), because some three years ago the Company with which he was associated took steps to remodel in some respects their washing and scrubbing plant; and the system adopted in principle had been somewhat similar to that explained by Mr. Clarry. At Newport they had recently put in two cyclone tar-separators. One, however, was working on comparatively cool gas, and the other on hot gas; and he could confirm what the author had said—namely, that the cyclone acting upon hot gas removed tar in large quantities and very rapidly, and had a very marked effect in reducing the quantity of naphthalene in the gas. There was a most interesting comparative analysis in the paper of cyclone tar taken from the seal-pot. He referred to it for this reason. The first was taken, he believed, in very cool weather, the second in warmer weather.

Mr. CLARRY: Rather hot weather.

Mr. CANNING said the chief difference there was the quantity of light oils removed, and middle oils to some extent. Of course, the light oils interested them most in their influence on the quality of the gas. With reference to this matter, he noticed one fact, and it was that the cyclone separator was in the open air. He might mention that in his own case the separator which was acting on the hot gas in one section of the plant was placed in the coal-store under cover; and he would suggest that possibly it might be an advantage to protect such an apparatus in cold weather. With regard to the liquid purification of gas, more particularly from sulphuretted hydrogen, he made a good many experiments some two years ago upon a new centrifugal washer which was erected at that time. This washer contained nine chambers arranged vertically; and it was a very efficient apparatus in that it produced a most intimate mixing of the gas with the washing fluid medium. They used the two top chambers (one filled with oil-gas tar, and the other with a patented preparation) for the removal of naphthalene, and the lower seven chambers for the removal of ammonia, and incidentally for the removal of the impurities sulphuretted hydrogen and carbonic acid. With regard to the removal of these two impurities, he would suggest—at least, this was what his own experience had led him to—that one could aim either at the removal of the one or of the other, but that it was very difficult to effect a compromise, especially with South Wales coal. With these coals, the proportion in which the carbonic acid stood to the sulphuretted hydrogen was about four to one, and in the case of many coals about five to one. Unfortunately, carbonic acid had a very strong affinity for ammonia; and the only portion of the ammonia which was available for the removal of the sulphuretted hydrogen was the sulphide of ammonium. This combined with the sulphuretted hydrogen and removed it to a certain extent; but after making some experiments with this end in view on the centrifugal washer, he found that, when the liquor was passed over the washer comparatively slowly—he was using liquor, and not clean water, and finishing off with clear water in the scrubber—it was completely carbonated, and there was practically no trace left of the sulphide. Of course, in this case, so far as the removal of sulphuretted hydrogen from the gas was concerned, the plant was absolutely inoperative. For this reason, he had reverted to what was the previous practice—namely, the passing of the liquor over in a comparatively rapid stream; and he quite thought that this generally gave one the best return, as regarded the removal both of sulphuretted hydrogen and carbonic acid. There was one matter he would like to refer to with regard to the key to the general arrangement of washer scrubbers. He gathered from the paper that the clean water was passed in at the gas outlet of No. 1 machine and No. 2 machine respectively, and that the same water passed right through the apparatus from end to end, and thence into the Livesey washer; so that it remained in contact with the gas all the time.

Mr. CLARRY: That is so.

Mr. CANNING: In this case, he would like to ask whether any experiments had been made of removing the water at the end of the first section of each machine, and using clean water or liquor in the second section. He fancied that under these conditions the maximum amount of sulphuretted hydrogen possible might be removed, for the reason he had stated before—that if left too long in contact with the gas, he found the liquor got completely carbonated. This was to some extent confirmed by the analysis given by the author of the condenser liquors, which it would be noticed contained a vastly larger proportion of sulphuretted hydrogen than did the liquors obtained from the brush machines. There was one very important thing to which Mr. Clarry had alluded, and to which he would like briefly to draw attention. This was the necessity for the complete removal of tar, as far as possible, before the washing process took place. He himself could speak with some experience about this, because some years ago, before their condensing plant had been extended at Newport, they suffered from this cause. Strangely enough the author had referred to a fact he (Mr. Canning) had noticed in his own experience; and that was that the last trace of tar removed from the gas—which he took it was the tar removed at the Livesey washer, in this case—had a peculiar aptitude for thickening. He could not give a reason for it; but at the time he mentioned, when they at Newport did not remove the last trace of tar before washing, he noticed, on opening a scrubber which showed signs of being blocked, that there was a heavy deposit of tar right on the top, where the cold water came in contact with the gas. There they had a cake of tar weighing half-a-ton, with the consistency of cream cheese. This would serve to confirm the author's remarks as to the thickening of this particular tar. As to the removal of sulphuretted hydrogen at all with liquid purification, opinions might differ; but in view of the very prejudicial effect of carbonic acid on the illuminating power and calorific value of the gas, it seemed to him that it was a question whether it would not be more profitable for gas undertakings in future to remove the whole of the sulphuretted hydrogen by oxide purification, which was now comparatively cheap, and to devote their attention to taking out the maximum amount of carbonic acid.

Mr. EVAN REES (Margam) said the paper dealt in an excellent manner with a subject of far-reaching importance in the process of gas manufacture. They had been shown that morning, in a highly interesting manner, the effect of, and necessity for, adequate tar extraction and wet purification—the facts and figures demonstrating such necessity. The author drew attention to the obvious need for extracting the thick, heavy tars before the crude gas reached the condensers, thus leaving the condensers to perform their main and proper function—cooling, not tar extracting—and so acting as a preventative of undue naphthalene and other troubles. There seemed to be no doubt that Mr. Clarry had succeeded in the objective of the work taken in hand, which had an important bearing on the value of the product as an illuminating and heating agent, apart from the enhanced value of the additional ammonia recovery, which appeared to him to be a long stride of advancement in this particular direction. He could speak, from personal experience of a similar arrangement of plant (though only on a minute scale in comparison with the plant now under review), of the efficacy and efficiency of ample condensing and washing apparatus, and incidentally of the effect being most marked on the work thrown upon the dry purification plant in consequence. He would like to ask Mr. Clarry what effect the new condensing and washing plant had shown on the dry purification, and if it had meant a higher working efficiency. If so, to what extent? He was of opinion that they were indebted to the author for this important paper, which was full of data regarding sound experimental and practical work on wet purification, which he thought would not be lost upon those present, and the results of which would undoubtedly be of great service to them in their respective spheres of labour. Mr. Clarry deserved the highest praise for the work entailed in the preparation of the paper.

Mr. A. W. BRANSON (Caerphilly) remarked that the paper was significant of a good deal of laboratory work and testing, which was in many cases too much neglected. In Cardiff, attention had been focussed on wet purification in a manner which looked like being well repaid. The strength of the liquor obtained from the new plant made it very evident that it was a great improvement on the old one. The absence of pumping must mean a considerable saving of steam, though he took it a certain amount of steam must be used for the driving of the machinery. Mr. Clarry had shown them that by the new plant they were avoiding the churning-up of the tar and liquor, and getting a much better quality. He did not give particulars of tests showing what improvement had been obtained in the calorific or illuminating power of the gas (if any); but no doubt on further experience some evidence on this point would be forthcoming. He gathered that the new plant would work in conjunction with the vertical retorts; and one would think with these the conditions of condensation would be more ideal and the temperature more even. Mr. Clarry's tar analyses did not indicate any high percentages

of light oils; and the results were exceedingly good in this direction. He had also shown them that the condensing should be done in series. It seemed to him the suggestion of Mr. Canning was a very good one—that the cyclone extractor would have been better perhaps if sheltered from the weather. In this country, there was a considerable amount of unevenness in the temperatures from day to day. They all noticed the care that Mr. Madden, in designing this plant, had exercised to avoid sudden changes in the temperature of the gas, and that the whole process was carried out gradually—tar removed while hot, and condensation carried out slowly and evenly. A strong point had been made of protecting the liquor from the atmosphere; and this was a matter which those of them who had new works to design should take special note of. They should remember that very considerable loss might be occasioned by the exposing of liquor to the atmosphere. It would be particularly interesting to see the plant after hearing the paper read. They all appreciated very much the fact that Mr. Clarry was giving them the benefit of the work that had been entailed in the installation of the system.

Mr. R. G. Clarry (Swansea) said their thanks were also due to Mr. Madden for having so generously permitted a junior to put this work before the Institution. Mr. Madden had, he thought, done very well in planning his new scrubber yard. He seemed to have laid it out so as to get the best efficiency and to conserve the ammonia, which he (the speaker) considered was one of the great points. One test, he noticed, showed 22 oz. liquor. He had never seen such liquor himself; but, of course, he did not doubt its being obtained. He supposed the idea was to secure as high a quality of liquor as possible, by conserving it, and preventing it getting into touch with the atmosphere, and generally dealing with it with a view to getting it to high strength. Had this ammonia conserving produced any effect on the sulphate plant? Had they made any more sulphate, in pounds per ton of coal carbonized, since the new arrangement had been in operation? With 22-oz. liquor, he should think this would be very likely. With regard to tar-fog, at Swansea they had not all the plant they needed for dealing with tar; and they had had some trouble recently with tar in their spent oxide. They drew in carburetted water gas at the exhauster; and this might in some measure account for it. He would be interested to know whether any other members had had an experience of this kind. There was another point he noticed in the paper. There was a test given on the outlet of the old scrubbers, where the grains of sulphuretted hydrogen per 100 cubic feet were 560, and of carbonic acid 1792. There was also a test of the gas at the outlet of the rotary scrubber. Looking at the figures, there did not appear to be much difference between those in the old scrubber yard and those in the new; but in the case of the old yard, there was more in the gas to start with. He took it, therefore, that the chief point in the scrubber yard was to get at the ammonia, and not so much to deal with the carbonic acid and sulphuretted hydrogen. While the arrangements and tests were most valuable, they indicated that they were only beginning to investigate a really important branch of the gas engineer's duties in regard to wet purification, and dealing with the ammonia, carbonic acid, and sulphuretted hydrogen by the wet process.

Mr. W. C. Jackson (Merthyr Tydfil) said there were one or two figures he would like to refer to. In the first table there was an analysis of the coal used, together with a few of its characteristics; and he noticed it was stated there that the candle power was 14·02 with the No. 2 "Metropolitan" burner, and the calorific value 600 B.Th.U. He would be glad to know how this was done. In his own case, when the gas came down to this candle power, the B.Th.U. would be below the 500 figure. Then with regard to the condensing temperature. The author gave the inlet and outlet temperature of the gas at the cyclone, but not the final temperature at the outlet of the condenser. At Merthyr they had had some difficulty with condensers in trying to keep the naphthalene content down as much as possible. On opening the condensers quite recently, it was found that about 5 feet of naphthalene and tar was deposited at the bottom. This was steamed and run into a breeze pond; but the whole mass caked-up again solid. At 55° they had worked all right previously, and had been able to bring the naphthalene down to something like 6 or 7 grains; but at a higher temperature the naphthalene became troublesome. In dealing with the water for the washers, the author said the quantity passing through during cold weather averaged about 10 gallons per ton of coal carbonized; and during the warm weather double this quantity; and about 24 gallons of 10-oz. liquor were produced per ton. Was this given in equivalents, or was it the actual result obtained? They had at Merthyr had a good deal of difficulty with regard to getting their liquor to strength. They had a rotary washer-scrubber, passing ammoniacal liquor through the first half and fresh water through the second half. The clean water, after passing through four compartments, was taken from there and conveyed to the tar washer. This plan answered very well, until a change of coal was made a year ago. Since then, however, they had had a good deal of difficulty.

Mr. J. E. Kenshole (Merthyr Tydfil) remarked that Mr. Jackson had already referred to Merthyr; and he would like to add that it seemed to him that this matter was still just as much in the "boiling pot" as ever it was. A little while ago, he read of the condensing being done—in Paris, he believed it was—as rapidly as possible. There was no desire there to obviate shock; they could not give the gas too much of a shock. For three or four years, or from the period of commencing at their new works, they had opened-out the condensers regularly; and he had never been able to find anything in them until this year. They had worked with several South Wales coals; but he thought there could be no doubt that they varied very considerably indeed. As he had said, no difficulty was experienced for three or four years; but this year when they opened them out, after working in the same manner and with the same heats, they found the condensers blocked right up. In fact, so much was this the case that they had to disconnect the plant and steam at the deposit and run it into a pond with breeze. The surface caked very rapidly; and he decided to take some samples and see what could be made of the matter on analysis. He had made inquiries that morning as to whether there were not any lighter tars or oils underneath that did not solidify; but they had heard Mr. Jackson say that the whole thing was caked into one solid mass. As far as he (Mr. Kenshole) was concerned, he was in just as much difficulty to-day as ever. They had changed their coal; and they did not know what was going to be the result, until they had had a trial for some considerable time. With reference to ammonia, when they started first of all with the new works, they had some difficulty with the underground tank; but they got over this, and by circulating the liquor in the last half of the rotary washer, considerably improved their working. The tar-well was divided into three sections. The tar and liquor were first separated by gravitation, and they pumped the liquor from the third compartment to circulate through the washer. In this way they did not stir up the tar at all; and by turning the liquor into the last half of the rotary washer, they found a considerable gain in the strength of their ammoniacal liquor. He was sorry that lately they had not found so much saving; but there, again, it was a question of coal. Personally, he did not think one could lay down any hard-and-fast rule for this sort of work. It was necessary to vary the arrangements according as the coal varied. If the author had tested a number of different coals, did he get the same results with the varying qualities?

Mr. A. E. Davey (Aberdare) expressed the wish that those of them who were connected with the smaller undertakings might have the pleasure of putting down such efficient plants as it was possible to instal at Cardiff. But one of the greatest difficulties they had to contend with, as Mr. Clarry had shown in the first portion of his paper, was the question of coal. His own experience at Aberdare had been that he had carbonized a certain coal, and had got the whole of the apparatus clogged, and then he had turned to another class of coal, which had had the effect of cleaning the plant. This showed that coal played a very important part, as did also the heats necessary for its carbonization. His humble opinion was that anyone who could carbonize Welsh coals could carbonize almost anything.

Mr. L. J. Langford (Abertillery) said he noticed that in the washing and scrubbing plant a very high ounce liquor was made. He was wondering whether the hydraulic mains were fed with liquor or water, and whether Mr. Clarry had his plant so arranged that the strength of the liquor stored in the underground tanks was not abnormal, because if it was very high one was apt to lose a certain amount of ammonia. Was the liquor in the tanks—somewhere about 10 oz.—arrived at by the drainage from the hydrauiic mains?

Mr. T. E. Franklin (Barry) remarked that the paper was particularly interesting to him, as having put in a plant of a very similar character, though differing in detail. He could assure those present that tests of the ammoniacal liquor, which circulated his plant in exactly the same way, passing away from the Livesey washer, showed that it averaged from 18 to 20 oz. without difficulty; and they could, he had no doubt, get it higher, if thought desirable. He agreed with Mr. Langford that it was undesirable to raise the strength to too great an extent, on account of loss by evaporation in the wells. But with his new plant he had taken precautions, as they had done at Cardiff, to see that every pot was properly sealed, and also that the tar-well was quite tight; and he had found a very great gain in the yield of ammonia—though he was not prepared to say exactly to what extent. With reference to the tar extracting, prior to the erection of the new plant at Barry, they had had great difficulty, as Mr. Clarry had experienced at Swansea, with the tar getting over to the purifiers. But since he had had the "P and A" tar-extractor, he had found very little tar indeed ever got into the Livesey washer. In connection with this particular machine, there was also a naphthalene washer, which they found very useful to pass such stuff as water-gas tar through, if any troubles were noticed coming on. He believed that he used pretty well the same coals as the rest of them; and he had had very little trouble from condensers, &c., blocking up. As to the removal of carbonic acid, he had arranged that when the gas had passed through the Livesey washer it should pass through the tower scrubber. The liquor supplied to this tower scrubber consisted of nothing but weak liquor from the hydraulics and condensers; and care was taken that the liquor should not lose any of its free ammonia by evaporation. It was pumped from the well to which it first ran, to a covered-in tank, and then a small pump on the outside of this delivered it to the covered canopy over the top of the distributing arrangement of the tower scrubber, so that there was no loss there. His principal object in carrying out this plan was to get rid of the carbonic acid. They should let the sulphuretted hydrogen take care of itself, because elimination by oxide was so cheap that it was not worth troubling about in the scrubbing plant. Mr. Clarry said he used from 10 to 20 gallons of water per ton of coal

carbonized; and he only obtained a total yield of 94 gallons of 10-oz. liquor per ton of coal. If they did this at Barry, they would get a much greater yield of weaker liquor.

The PRESIDENT: It is converted back to the 10-oz. strength.

Mr. CLARRY, in replying to the points raised, said Mr. Canning had asked about the flow of water through the washers. There were two streams. The rotary washer was divided into two sections—No. 1 and No. 2—and a stream of water went through both sections in parallel.

Mr. CANNING: The clean water that flows into the first section is the same as goes into the second section?

Mr. CLARRY said that was so; but it did not go from No. 1 to No. 2 machine. As to thick tars, a great deal, he thought, was owing to the way the cold water came in. It might to some extent be due to the peculiarity of Welsh coals. Mr. Rees had asked about the effect on dry purification. He had not made any tests on the oxide plant or lime plant itself. Therefore he could only refer him to the figures in the paper. The 22-oz. liquor was as it came down in the condensers. The sulphate per ton of coal was between 19 and 22 lbs. As most of the ammonia was taken out in the condensers, they could spend a little time dealing with the carbonic acid and sulphuretted hydrogen. The figures given of analyses of coal were not of one particular coal, but of a series of tests taken on the test plant and works generally. The water was the actual amount taken, from readings by a water-meter. It varied from time to time, of course, according to weather conditions. No one coal had been carbonized at all. They were mixed Welsh coals. The hydraulic main was fed with weak liquor from No. 1 yard. At present they had no connection laid in from No. 2 yard to feed the hydraulic main.

The PRESIDENT, referring to that "thick stuff," asked what it was, and added that his own idea was that it was free carbon. There were minute particles of free carbon which solidified on cooling; and if they were examined microscopically, one could see the water round each atom. When laid out in the air, this dried; and the free carbon particles set just like iron. One of the lessons of the paper, or the moral of it, was: "Do not believe in the Twaddel hydrometer." All the tests were carried out on the Wills distillation method. One obtained such miraculous readings when the liquor got high, and contained a great deal of fixed ammonia, that the Twaddel hydrometer was "twaddle." There was a difference of 5, 6, or more ounces between Twaddel readings and Wills's. He meant that the Twaddel was reading short by 5 or 6 oz. This was a matter which should be known; and they should watch it.

THE ILLUMINATING ENGINEERING SOCIETY.

The Report of the Council.

In last week's issue, reference was made to the proceedings at the annual meeting of the Illuminating Engineering Society; and in the course of the notice, it was stated that the annual report of the Council was presented by the Hon. Secretary (Mr. Leon Gaster), and would, as soon as a copy was available, secure further notice in our columns. Mr. Gaster has since forwarded a print, from which the following points are taken.

The report opens by stating that the past year was fruitful in co-operation with other societies. One of the most important events was the formation of the International Commission on Illumination and of National Illumination Commissions in several of the respective countries interested.

PRESIDENT AND VICE-PRESIDENTS.

Regarding the presidency, the Council said: During the past five years, the Society has enjoyed the great benefit of Professor Thomson's experience and able guidance as President, and, at the request of the Council, he several times consented to continue in office at the end of the year. But now that the Society has passed through its initial stages, and may be looked upon as firmly established, the Council has reluctantly acquiesced in his desire to be relieved of the presidency, owing to the pressure of other work. The Council desire to place on record their appreciation of Professor Thomson's great services to the Society. During the past years the Society has covered very general ground, and in dealing with such a variety of topics the President's versatile knowledge has been invaluable. Now the Society is proceeding to the discussion of practical applications and the treatment of specific problems in more detail. One of the most important aspects of illumination at the moment is in relation to hygiene and eyesight; and it is essential, in dealing with this subject, to enlist the support of the medical profession. As is well known, Sir William Bennett, K.C.V.O., F.R.C.S., has consented to accept the presidency for the coming session. The Society is extremely fortunate in having secured as its next President such an eminent member of the medical profession.

The Society has also added to its number several distinguished Vice-Presidents, including Professor Vautier, the first President of the International Commission on Illumination, and Sir Thomas Oliver, who is prominently connected with the subject of industrial hygiene, in which illumination is now recognized as playing an important part.

In view of the necessity of co-operation with kindred bodies—particularly those associated with the Society on the National Illumination Commission—a proposal was made by the Council to the Institutions of Gas and Electrical Engineers that their Presidents should be *ex-officio* members of Council and Vice-Presidents of the Illuminating Engineering Society. This invitation was accepted, and during the past year Mr. W. Duddell and Mr. Edward Allen, the Presidents of these Institutions for the year, kindly consented to act in this way.

In recognition of his services as Chairman of Council during the past two years, Mr. F. W. Goodenough has been created a Vice-President.

MEMBERSHIP.

The membership of the Society has now increased to over 470—an addition of about 80 members during the year.

The following are the proportions in which the various interests are represented:—

Electrical engineers and members concerned mainly with electric lighting	36
Gas engineers, manufacturers of gas appliances, &c.	20
Professors of physics and engineering, experts in photometry, &c.	12
Representatives of oil, acetylene, petrol-air gas lighting, &c.	7
Physicians, oculists, opticians, &c.	8
Architects, surveyors, &c.	5
Miscellaneous, including public lighting superintendents, mechanical engineers, makers of shades and reflectors, and others not exclusively connected with any one system of lighting	13
	100

Fuller representation of the gas industry is still desirable; and it is also to be hoped that in the near future the number of members representing the architectural profession will be considerably increased.

EXTENSION OF MEMBERSHIP IN THE PROVINCES.

For some time it has been felt that an effort should be made to increase the representation of the Society outside London. At the National Gas Congress and Exhibition in October, 1913, the suggestion was brought forward by Mr. R. G. Shadbolt that it would be of assistance for meetings to be held occasionally at certain centres in the Provinces, so that those members who reside outside London might have an occasional opportunity of taking a more active part in the Society's gatherings. The Council hope that before long it will be possible to arrange for special local meetings of this kind; and it is proposed for the time being to nominate representatives of the Society in some of the chief cities, who will assist in increasing the membership in their locality. Representatives have already been appointed in Glasgow, Manchester, Leeds, Liverpool, and other cities. Meantime it is hoped that members residing out of London will make a special effort to interest friends in the movement, so as to secure as soon as possible the necessary representation in their district.

JOINT COMMITTEES.

A review of the work at the meetings held by the Society during the session follows; and then reference is made by the Council to the labours of the Joint Committees appointed by the Society. Interim reports have been issued by the Joint Committees on School and Library Lighting. Special reference is made to the valuable services of the Chairman of the Joint Committee on School Lighting, Dr. James Kerr. Mention is made of the representation of the Society on the Joint Committee composed of members of the Illuminating Engineering Society and the Institutions of Gas and Electrical Engineers, appointed to consider the preparation of a standard specification for street lighting. This Committee is still considering the draft specification presented by Mr. A. P. Trotter in his paper before the Society last year. It is probable that several other committees may be appointed as a result of discussions at recent meetings. Finally, there is the National Illumination Commission of Great Britain, formed during the past year, which constitutes a new outlet for the activities of the Society.

NATIONAL ILLUMINATION COMMISSION OF GREAT BRITAIN.

In the report of progress during the vacation (1913), an account was given of the formation of the International Commission, which took place in Berlin last August. It will be recalled that at the International Electrical Congress in Turin in 1911 a resolution was passed unanimously approving the formation of such a Commission, at the initiative of this Society. It has now, happily, been found possible to form the Commission by suitably enlarging the membership and functions of the International (Zurich) Photometric Commission. The first step was the formation of provisional National Committees in the respective countries. After several meetings, the British Committee reconstituted itself as the National Illumination Commission of Great Britain. On this body the Institutions of Gas and Electrical Engineers are represented, and, through the Illuminating Engineering Society, other bodies interested in illumination. The representatives of the Illuminating Engineering Society are Professor Silvanus P. Thomson (President), Mr. A. P. Trotter (Vice-President), Mr. F. W. Goodenough (Chairman of Council), Mr. L. Gaster (Hon. Secretary), and Dr. James Kerr. The National Commission has the privilege of appointing two of its members to act as delegates to the International Commission on Illumination, and contributes to its maintenance £50 per annum. It has been

arranged that each of the Societies represented shall pay £25 annually to the expenses of the National Commission, which will enable the Commission to meet the subscription referred to—leaving an income of £25 per annum for local expenses.

The formation of National Commissions is being actively taken up in other countries. It is of interest to mention that in Germany it has been decided that the Illuminating Engineering Society in that country will act in this capacity.

Other International Developments.

The formation of Illuminating Engineering Societies in the various countries will do much to pave the way for international co-operation, and doubtless arrangements will be made for the Societies to be kept in close touch with each others work. In the case of the British Illuminating Engineering Society, the connection with its corresponding members in various countries has proved an invaluable means of ascertaining international opinion on current topics and finding a common basis of agreement.

An Illuminating Engineering Society has not yet been formed in France, but during the past year a new French journal devoted to illumination, *La Science et Art de l'Eclairage*, has been issued under the direction of Professor A. Blondel.

Congresses During the Past Session, &c.

During the past year there has been an exceptional number of congresses and meetings of other Societies, at which various aspects of illumination were discussed; and in several cases papers were presented by members of the Society.

Departmental Committee on Industrial Illumination.

The formation of this Committee early in 1911 was dealt with fully in the Council's annual report in that year. During the past session, the Committee has been at work; and it is understood that visits to many factories have been made and some very complete data on industrial illumination collected.

Additional Support Required.

The Society has again been able to carry out a considerable amount of useful work, and yet to keep its expenditure within bounds. The circumstances that render this possible were detailed in the annual report for 1912-13. At the same time the growing activities of the Society make the present arrangement somewhat burdensome; and its future work may be hampered unless more ample funds can be placed at its disposal. A substantial increase in membership is still necessary to enable the Society to extend its activities; and the Council desire to emphasize the importance of securing additional members. The Society has now a record of valuable work behind it, and its usefulness is beyond dispute. It may therefore reasonably expect that those who benefit by the movement will give their aid, and enable it to extend its present sphere of work.

Masonic.

At the Annual Meeting of Grand Mark Lodge, held at the Mark Masons' Hall, London, Mr. J. W. Broadhead, the Managing Director of Messrs. Robert Dempster and Sons, Limited, of Elland, and Chairman of the Society of British Gas Industries, was appointed Senior Grand Deacon.

The installation meeting of the Northern Star Lodge No. 3053 was held at the Midland Hotel, Manchester, on Friday evening last. There was a goodly muster of both members and guests—including the W. Ms. of the Evening Star and Murdoch Lodges. The officers appointed and invested for the year 1914-15 are as follows:—

Bro. Thos. W. Jordan (Stockport) . .	W.M.
„ S. Meunier (Stockport)	I.P.M.
„ James M'Ewen (Manchester) . .	S.W.
„ E. J. Wellens (Hebden Bridge) .	J.W.
„ R. Surtees (Burslem)	Chaplain.
„ Walter Whatmough (Heywood) .	Treasurer.
„ R. G. Shadbolt (Grantham). . .	Secretary.
„ John Bond (Southport)	S.D.
„ John Fisher (Lytham).	J.D.
„ W. Batt (Ansdell)	D.C.
„ F. H. Lamb (Sale)	Organist.
„ E. O. Watson (Rawmarsh) . . .	Assistant Secretary.
„ W. B. Hudson (Prestwich) . . .	I.G.
„ J. W. Morrison (Sheffield) . . .	Steward.
„ Joseph Taylor (Bolton)	Steward.
„ T. Ousey (Manchester)	Steward.
„ R. H. Garlick (Salford)	Steward.
„ J. W. Scott (Stockport)	Charity Representative.

At last week's meeting of the Evening Star Lodge, No. 1719, the W.M., W. Bro. E. G. Smithard, of King's Lynn, initiated Mr. H. D. Duesbury, the Engineer and Secretary of the Hertford Gas Company. Bro. Ernest W. Drew, the Secretary of the Barnet District Gas Company, was elected a Joining Member; as was also W. Bro. C. J. Chree, of the Brentford Gas Company.

MIDLAND ASSOCIATION OF GAS MANAGERS.

Meeting at Mansfield.

Pleasurable experiences were associated with the assembly of members of the Midland Association of Gas Engineers and Managers last Wednesday, in the picturesque North Nottinghamshire territory of which Mansfield forms the centre. Following the business meeting in the borough, an itinerary had been arranged embodying a tour within the Dukeries district; the objective point being Welbeck Abbey. An official reception of the visitors by the Mayor of Mansfield (Alderman T. Taylor, J.P.) and the Chairman of the Gas Committee (Councillor T. Smith), who were accompanied by other members of the Corporation, preceded the business of the Association. The subsequent inspection of the gas and electricity works, which, with the water undertaking, represent the remunerative branches of Mansfield's public enterprise, was not devoid of interest upon the technical score. There has been marked growth to be noted locally in recent years in relation to the main sources of supply, consequent upon the rapid development of the town brought about mainly by the exploitation of mineral resources in which the neighbourhood abounds. One of the Mansfield collieries opened only a very few years ago has already afforded an output constituting a world's record for the quantity of coal "turned" within a daily or weekly period; and other potentially rich seams are in process of being revealed. A new district railway is rapidly approaching completion to establish a direct means of communication with the Immingham Docks, whence much of the Nottinghamshire coal is already being transported. Altogether the outlook appears to warrant the anticipation that Mansfield is destined to be almost equal in importance as a colliery centre to Doncaster itself.

Members from the Birmingham district were subsequently joined by those travelling from Nottingham; the journey to Mansfield through the Leen Valley affording an opportunity of catching glimpses of pitheads of miles of underground workings, some of them now old and approaching within a measurable period of exhaustion, for which inevitable contingency compensation is forthcoming in the newer enterprises immediately surrounding Mansfield and trending northwards towards the Yorkshire border.

Welcome to the Members.

Local interest in the visit was naturally accentuated by the fact that this year's President of the Association is Mr. W. J. Rendell Baker, the Engineer to the Corporation, who was responsible for the details of an admirably arranged programme. At the Town Hall, the Mayor expressed the pleasure which it afforded him on behalf of the Corporation, and more especially that portion of it represented by the members of the Gas Committee, to welcome the members of the Association to the borough. It did not seem so very long since that he was engaged in a similar ceremony, but he was extremely sorry to say that the gentleman he then supported (their late Manager, Mr. Arthur Graham) was among them no longer. In his successor, Mr. Rendell Baker, the Corporation possessed an excellent official, in whom every confidence was felt; and while the fact that he was President of the Association for the past year must be regarded by Mr. Baker as a great pleasure to himself, they also looked upon it as a compliment to the town. He hoped the members would, when leaving the neighbourhood at the end of the day's work, carry away with them altogether agreeable memories of the visit, and especially of their tour of the Dukeries district.

Mr. T. Smith, the Chairman of the Gas Committee, added to the welcome of the Mayor an expression of the pleasure of himself and his colleagues at the opportunity which was afforded of meeting the members of the Association. They considered it a great honour to Mansfield that the President of the Association for the year was their own Gas Manager.

The President returned thanks on behalf of the members for the cordial greeting which had been extended by the Mayor on behalf of the Corporation. He did not regard it so much as a compliment to himself personally as it was in his capacity as President of the Association. He proposed a resolution heartily thanking the Mayor and Corporation for the courtesy and kindness which had been displayed.

The proposal, which was seconded by the Vice-President, Mr. C. H. Webb, of Stourbridge, was carried with acclamation; being briefly acknowledged by the Mayor.

The Business Meeting.

The business meeting, which was of brief duration, was then proceeded with under the chairmanship of Mr. Baker.

The President referred to the loss which the Association had sustained by the death of Mr. Charles Meiklejohn, of Rugby. All who knew Mr. Meiklejohn were cognizant of his sterling worth. The gas industry, and this Association in particular, were the poorer by his death. Mr. Meiklejohn was a man of broad experience, who always went straight, saying what he meant and meaning that which he said. Many of them had acquaintance with deceased's work apart from his connection with the gas industry, and of him it might be fittingly said that a man's good deeds lived after him. The death since their last meeting had also occurred, after a long illness, of Mr. Jones, of Burslem. It was not his good fortune to know much of Mr. Jones, but he could say that all in the profession appreciated his sterling work. He proposed that

letters of condolence should be forwarded to the widows and children of the deceased on behalf of the members of the Association.

The proposal was endorsed by the members rising.

The PRESIDENT also referred with regret to the absence through illness of Mr. A. Cooke, of Oldbury, a Past-President of the Association, and upon his suggestion it was decided to telegraph: "Members of the Midland Association at Mansfield regret cause of your absence, and send hearty good wishes for continued recovery."

The proposal was readily endorsed.

The President afterwards acknowledged the receipt of a communication from Mr. J. H. Collins, the Chairman of the Mansfield Electricity Committee, extending an invitation to the members to visit the Corporation's electricity undertaking after their inspection of the gas-works. The Chairman of the Water Committee (Alderman Allcock) had also kindly intimated the pleasure which it would afford his colleagues and himself if the members, upon their way back from Welbeck, would take the opportunity of inspecting the Clipstone pumping-station, which formed the latest addition to the town's resources. Alderman Allcock regretted his inability to attend the meeting.

NEW MEMBER.

Mr. G. N. Gribble, of Kirkby-in-Ashfield, was elected a member of the Association.

VISIT TO THE GAS-WORKS.

The members proceeded after the meeting to the gas-works, of which the salient features were inspected under the guidance of Mr. Baker, who succeeded to the engineering control after the death of Mr. Graham. The Mansfield undertaking, which was acquired in 1878 from the private Company which had had the control of the town's gas supply since 1823, has afforded a very substantial return for municipal investment, contributing on an average £1500 annually to the rates. The Corporation acquired the works at a cost of £37,000, and *pari passu* with the growth of requirements have come many additions; the capital at present invested in the undertaking being £133,228. A sulphate plant was installed six years ago; but the appliances in other departments of the works are of a very archaic type. The determination was some time since arrived at to effect a much-needed remodelling process by installing vertical retorts; and although no contracts have yet been placed, the Committee responsible for the control have been busily engaged collecting data, for which purpose visits of inspection have already been paid to Leeds, Hull, and Cleethorpes. It is also intended to extend the tour of investigation to Birmingham, Manchester, and Nottingham. The plant at present in operation is capable of producing 1½ million cubic feet of gas daily; but with the present extension of the town it is obvious that the carbonizing resources must be considerably amplified.

Following the inspection of the gas-works, a visit was paid to the electricity station.

THE LUNCHEON.

Luncheon was then partaken of at the Swan Hotel, by invitation of the Mayor and Corporation; there being among those present Mr. T. Smith, the Chairman, Alderman Maltby, Alderman J. L. Wilson, Alderman J. Crampton, and Councillor Hardy, members of the Gas Committee; Councillors J. H. Collins, the Chairman of the Electricity Committee, J. Farmilo, and E. Ball.

The MAYOR having given the loyal toast,

Alderman W. R. COOPER, J.P., of Banbury, proposed "The Town and Trade of Mansfield," expressing the pleasure which he had derived from his visit to the borough, where he had observed, on his arrival the previous night, that the streets were well lighted. The outward evidence warranted the idea that Mansfield was a thriving industrial centre, and he trusted that its prosperity would long continue. The coal industry was all important to Mansfield, as to many other centres; and he hoped that in the interest of those who were responsible for the ownership and control of gas undertakings, the coal bill would not be made too heavy. King Cole, as they were assured in the song, was a "merry old soul;" but if the price of coal was made too high, they might not be able to dance to the tune. His hope therefore was that those engaged in the mining industry might see their way to reduce the present high rates. Residuals were now realizing only a very poor price; and if the price of coal were further advanced, their commercial prosperity might be greatly reduced. This certainly was not a desirable condition of things to contemplate. It was impossible that the gas industry could continue to pay the high prices hitherto charged for the raw material.

The MAYOR, in responding to the toast, mentioned as an indication of Mansfield's development that, whereas when he came to the town about fifty-five years ago the population was only 8000 or 9000, it amounted to-day to something like 44,000 or 45,000. It could be well understood, therefore, that he had witnessed some striking advances during the period of his residence. With regard to local industries, they were fortunately circumstanced in Mansfield; their trades being numerous and varied. The principal industry was, of course, mining. They possessed one pit in the town, the Crown Farm Colliery, the average weekly yield of which was 25,000 tons—this undertaking holding a world's record. The town possessed many important commercial undertakings; and of the publicly-owned enterprises the gas-works were doing exceptionally well. They were fortunate in possessing such an excellent Manager as Mr. Baker; and they regarded the fact that he was President of the Association for the year as a compliment to the town.

Mr. T. SMITH, the Chairman of the Gas Committee, in proposing "The Midland Association of Gas Engineers and Managers," said he thought it was a good thing that members of the profession should unite to exchange views upon matters to the advantage of the undertakings with which they were severally connected. The best results were doubtless obtained in this way. In Mansfield, gas was being sold to ordinary consumers at 2s. 6d. per 1000 cubic feet, while slot-meter users were only being charged 1½d. per 1000 feet more. It might be thought by some that they were not doing the right thing in permitting only such a small difference in price between the two classes of customers; but they recognized that the slot-meter users were their most fruitful contributors. They anticipated that within the next three or four years their new Manager might be able to reduce the price by from 4d. to 6d. per 1000 cubic feet. In relation to the charges for coal, he was not one of those people ordinarily given to grumbling, as long as he knew that the advanced rates were benefiting somebody. He agreed that every man should have a fair wage; but beyond that he was not prepared to go. In Mansfield last year 2101 million cubic feet of gas were sold. It was intended to hold a gas exhibition in the town next year, and it was hoped to absolutely revolutionize existing local arrangements. They intended to canvass the borough in regard to gas supply, and he should not be surprised if ultimately the annual consumption increased from 2101 million cubic feet to 4202 millions.

The PRESIDENT, in acknowledging the toast, expressed his appreciation of the great honour which had been conferred upon him by his appointment to the office. In consequence of his removal to Mansfield, he had asked that his election might be deferred, but he was told that he must go on, and he was proud that he had done so. It was impossible that he could have undertaken the office, however, without the help he had received, not merely from managers but from the Mayor and members of the Mansfield Gas Committee, who had afforded him their most hearty support. The point had been mentioned as to the possibility of reducing the price of gas locally in the next few years by 6d. per 1000 cubic feet. But it must be remembered that the revenue from slot meters had already been substantially reduced, while there was a falling market for coke and all residuals. Where was the revenue to come from if they were to maintain the present ratio of contributions to the rates? The consumption was increasing—having, since he took over the management, gone up by two million cubic feet a month. Last winter every retort was worked-out; and the demand was increasing by leaps and bounds. He thanked the members of the Association for visiting the town—many of them having come at considerable inconvenience from distant places; the district covered by the work of the Association extending to below Gloucester up to Hull on the east coast and Liverpool on the west. He was well satisfied to think that out of 130 members he had the majority present that day. He esteemed it a high privilege to be President of the Association, and honoured by the circumstance that the meeting had been held at Mansfield.

Mr. W. B. SMITH, of Walsall, proposed the toast of "The Chairman and Members of the Mansfield Gas Committee." He congratulated the Committee upon the success which had already attended the undertaking, and hoped its prosperity would continue. New works which were in contemplation must be of advantage to the town.

Mr. T. SMITH, in replying, mentioned that he had been a member of the Gas Committee for ten years. They thoroughly realized their responsibilities and the nature of the work which lay before them. He was glad to remember that the last words which he heard their late Manager utter before he left home was that he was perfectly happy with his Chairman and his Committee—in fact, the late Mr. Graham went as far as to say that he had never had a better Committee in his life.

TOUR OF THE DUKERIES.

After luncheon the party entered upon a tour of the Dukeries, in which the woods, resplendent in vernal beauty after recent rains, afforded vistas of rare picturesqueness. Tea was served on the return to Mansfield; the day's programme—thanks to Mr. Baker's arrangements—proving delightfully entertaining.

Maryport Gas Undertaking.

The statement for the twelve months ending March 31 of the Maryport Urban District Council gas undertaking shows that the gas sold, including public lights, was 39,375,100 cubic feet. There was an increased consumption through ordinary meters of 1,093,900 feet, which represents an additional revenue of £178; but the reduction in price as from Oct. 1 accounted for a much greater decrease of revenue; and there is a debit balance on the year's working of £37. But for the reduction in price, the works would have shown a profit. Tar realized 31s. 9d. a ton, as compared with 33s. 2d.; and sulphate £11 15s. 5d. a ton, against £13 1s. 4d. in the preceding year. The Gas Manager, in his annual report, states that the make of gas per ton of coal used was 9751 cubic feet, as compared with 9569 feet in the previous year. The make was militated against by having to work with an insufficient number of retorts, while the new retort-bench was being erected, and afterwards by a great number of stopped pipes, which necessitated lighting up the old beds. No difficulty is now experienced in attaining a make of well over 10,000 feet per ton with small coal. The Council have authorized the Manager to arrange for the cutting and filling of the trenches for the main to Flimby (a village 1½ miles away) on piecework; preference being given to local men who are at present out of employment. Various additions to the plant at the works are under consideration.

Falmouth Town Council and the Water-Works.—A suggestion that the Falmouth Town Council should consider the question of purchasing the undertaking of the local Water Company has been referred to the General Purposes Committee. The member who introduced the matter voiced his belief that all councils should own the water-works, and that if Falmouth did so it would mean a great saving to the town generally. The Mayor, however, pointed out that this depended upon how much one had to pay for the undertaking.

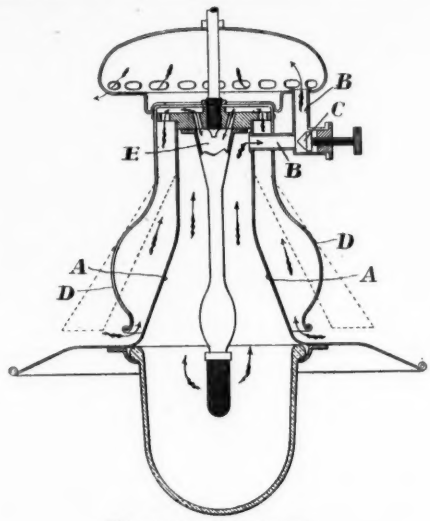
REGISTER OF PATENTS.

Gas-Lamps.

TILLEY, F. C., of Kingsland Road, N.E.

No. 10,657; May 6, 1913.

This invention relates to an inverted incandescent gas-lamp in which all the air to support combustion at the burner passes into the mixing-chamber by an air inlet, above the valve or regulator, for controlling the exit of the products of combustion from an enclosed globe "for the purpose of regulating the admission of primary air entering the mixing-chamber." In this way "the supply of air to the mixing-chamber is determined to form with the gas a mixture of proportion capable of perfect combustion at the burner."



Tilley's Regulator Burners.

In the lamp shown, surrounding the burner-tube, and at a slight distance from it, is another tube A, concentric with it, and from the upper part of this is an outlet B to the atmosphere (either direct or through the dome), and carrying a valve C, so that the products of combustion passing up between the burner-tube and the tube B can be controlled. Surrounding the tube A is another tube D, or tubes, spaced outside the tube A (see dotted lines), through which atmospheric air may pass to the mixing-chamber E.

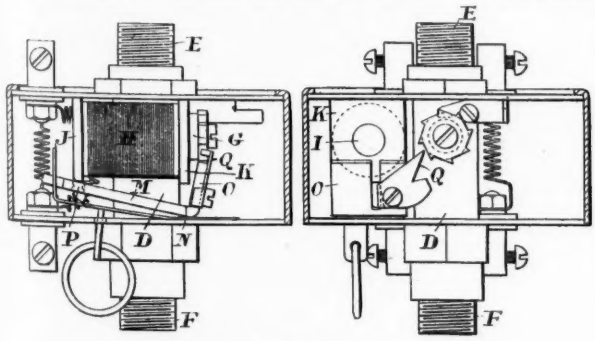
The patentee says he has found that, by thus regulating the outlet of the products of combustion to the air, the inlet of the air to the mixing-chamber by an air inlet which is above the outlet valve regulator is automatically regulated, and a more brilliant light and a better flame obtained than by any known construction of such lamp. The tubes for the escape of the products of combustion, and the surrounding ones for the admission of air to the mixing-chamber, are tapered in their length—made broader at the inlet than the outlet.

Controlling the Supply of Gas to Burners.

OSTROROG, Count S. J., of Netherton Grove, Chelsea.

No. 10,166; April 30, 1913.

This invention relates to valve mechanism for controlling the supply of gas to a burner, adapted to be operated from a distance by means of electrical energy from a suitable source. It consists in improvements in the electrical and mechanical devices for operating the gas-valve, by arranging an electro-magnet with a soft-iron core and with iron pole extensions, and a specially mounted armature in direct contact at one end with one pole extension, and having at its other end a gap bridged



Ostrorog's Gas-Burner Controller.

by a prolongation adjacent to the other pole, and which prolongation moves indirectly towards the pole, and may be also utilized for carrying the pawl or other like device for operating the gas-valve.

In the accompanying sections, taken at right angles to each other, D is a square central hollow stem with the gas inlet E at one end and the gas outlet F at the other; while the cylindrical valve G is placed between. By the side of the stem containing the valve to be operated is arranged horizontally a bobbin H, wound with insulated wire and provided with an iron core I, which terminates at each end in iron plates J and K respectively. These plates form prolongations of the respective poles of the magnet, and have formed on their upper edges short tangs or pins which pass through holes in the cover plate to which they are riveted, thereby securing the plates J and K and bobbin H in position on the plate.

To the lower end of the pole extension plate J is pivoted or hinge-jointed the armature M, which extends below to a point opposite the lower edge of the other plate K—a gap being normally maintained between the free end of the armature and the lower edge of the plate. A pin or stop N of non-magnetic material may be interposed between the edge of the plate K and the armature M to prevent actual contact between the two surfaces, and thereby avoid the holding-up of the armature after the current is cut off from the bobbin H.

To prevent the gap diminishing the efficiency of the coil, the free end of the armature is bent upwards at right-angles as shown at O, so that it assumes a position more or less parallel and close to the outer surface of the plate K when in its attracted position. The effect of this bending upwards, combined with the pivoting or hinging of the armature in the position shown at P, is that the movement of the portion O is not directly towards and away from the plate K. The gap at this point may be very small for a considerable movement of the whole armature; and the current required for starting the movement of the armature is thus greatly decreased, and the efficiency of the magnet correspondingly increased. In other words, a single coil or bobbin of minimum size is sufficient to effect the movement required for which a larger single bobbin or two separate bobbins have been heretofore employed.

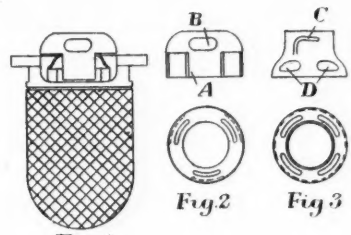
Upon the bent-up portion of the armature a pawl or pin may be mounted for effecting the movement of the gas-valve. For example, the pawl Q with a stop R may be pivotally mounted on O in such a manner that the pawl engages with one of the teeth of the ratchet-wheel shown formed on the outer end of the cylindrical valve G at each upward stroke of the armature as it is actuated by the passage of a current through the coil or bobbin H, and the valve G will thereby be moved round the space of one tooth every time the coil is energized—the armature falling back by gravity when the current through the coil ceases.

Mantle Supports for Incandescent Gas-Burners.

MITCHELL, G. P., of Edinburgh.

No. 11,701; May 20, 1913.

This invention relates to mantle supports for incandescent gas-burners—particularly of the inverted type. Concerning them, the patentee remarks that while it has been previously proposed to lock mantle frames by means of flat rings, without ventilation holes, slidable on the burner, his invention is in the form of a loose ring, with ventilation holes, free to slip up and down the burner—thus permitting of the insertion of the mantle frame, but capable of locking the same in position.



Mitchell's Incandescent Mantle Support.

Fig. 1 shows the mantle support with the mantle and ring in position. Fig. 2 shows an elevation and a plan of the locking ring in detail. Fig. 3 is an alternative arrangement for locking the mantle in its support.

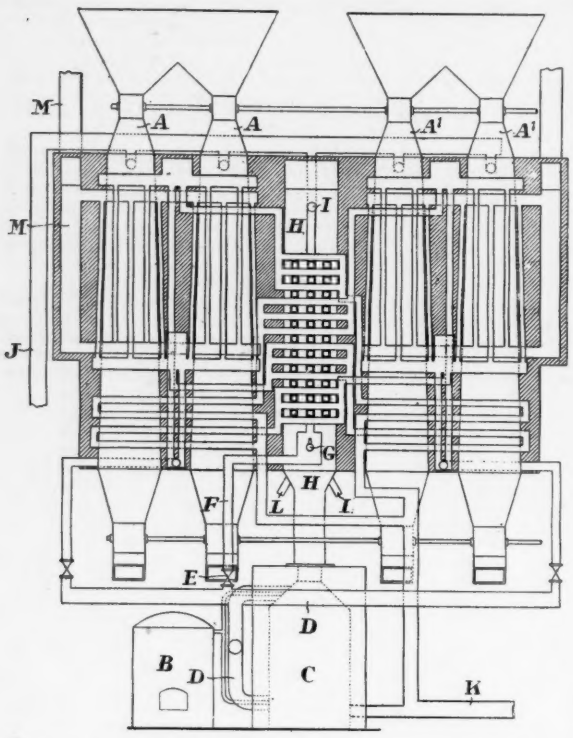
On fig. 2 is shown the ring in detail, with projections A for engaging in the recesses on the frame of the mantle support. To allow the products of combustion to clear from the ring, small holes B are drilled. In fig. 3 the projections are done away with. The locking action is here effected by a small pin screwed into the burner, so as to engage with a groove C; and when the ring is turned through an angle, it will wedge the mantle in position. The ring also has ventilating holes D.

Distillation of Coal.

STEPHENSON, J., of Salisbury.

No. 13,104; June 5, 1913.

This gas-making plant is of the kind in which vertical retorts are combined with a water-gas generator, with the object of attaining "great uniformity of working." Accordingly there is provided a series of continuously operating vertical retorts heated by flues communicating with combustion chambers into which are passed superheated air and water gas from one of two generators. It is preferred to heat the air first by passing it round the bottom of the retorts, and to superheat it by passing it through a heating flue or chamber connected with the generator. The water gas from the generator is partly used to heat the retorts, and the other portion for illuminating purposes—preferably after being carburetted. In this case the carburetting and superheating of the water



Stephenson's Combined Vertical-Retort and Water-Gas Plant.

gas take place in flues, or in a chamber adjacent to the flues in which the air is superheated.

In the accompanying diagrammatic view (partly in section and partly in elevation) of the combined plant, there are two pairs A A^1 of vertical retorts, preferably arranged within a brickwork setting, and provided with series of flues. B is a gas-fired boiler which passes steam into a water-gas generator C. A second water-gas generator stands immediately behind the first, and is therefore not visible. The patentee points out that since two generators are employed there will be a continuous flow of water gas through the pipe D, since either one generator or the other is always at that phase in which steam is being blown through.

The water gas leaving the generators is distributed by means of valves which allow passage of the gas for the purpose of heating the retorts on either side of the centre flue. The valve E admits the water gas which is to be carburetted, and to be used for illuminating, through the pipe F, past the oil spraying device G, and into cross flues which extend within the heating flue H. The carburetting and superheating both take place within these cross flues, and the carburetted water gas emerges at the point I. It can then either be mixed with the coal gas produced by the retorts and drawn off through the pipe J or separately, as desired.

For heating the flue H, air is blown through the pipe K into the generators C, and the producer gas so formed is passed into the flue; while air is let in through the pipes L, if desired, by natural draught. A vigorous combustion takes place within the flue; and the products of combustion are passed into the chimney, M, or may be used for heating purposes; and in some cases they may be employed for heating the boiler B. The flue H serves to heat not only the cross flues through which passes the carburetted water gas, but also the flues that surround the lower parts of the retorts. The flues then pass through the heating flue H, and are connected to the combustion chambers above.

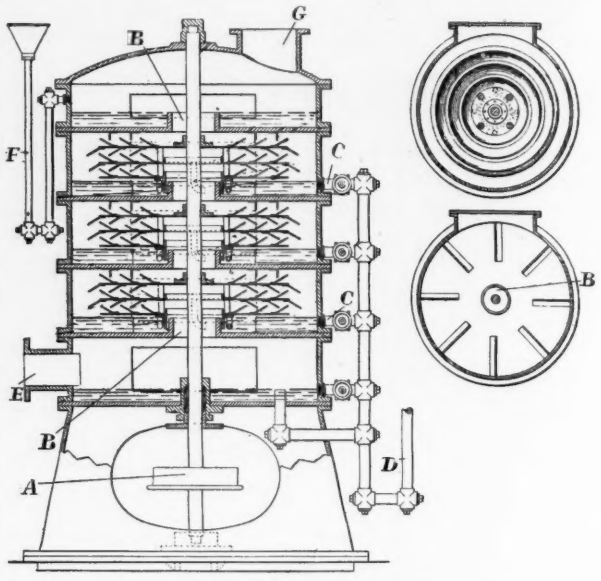
The operation of the plant is briefly summarized by the patentee saying that the generators produce water gas, part of which is led into the combustion chambers and part is passed through the cross flues, where it is carburetted in order to be made suitable for illuminating purposes. Combustion takes place in two ways: First the large flue H is heated by producer gas from the generator being continuously burned in the presence of air; and this flue thus heats the cross flues for the carburetting, and at the same time superheats an air supply which has been first heated by passing round the bottom of the retorts. This superheated air is then led to the combustion chambers, where it meets the portion of the water gas which serves for heating purposes. The vertical retorts A A^1 are then heated by a series of flues fed from the combustion chambers.

Gas Washer or Scrubber.

FIDDES, W. J., of Tottenham.

No. 13,813; June 14, 1913.

This gas washer or scrubber is constructed of superposed compartments, the floor of each of which has a central opening with a wall around it. A vertical revolvable shaft passes through the bottom openings of the compartments; while a series of revolving ring trays of flat form, or having upturned lips at the edges, is provided with depending scoops for lifting the water from the bottoms of the compartments into the trays. The revolving of the trays flings the water contained in the trays, in spray form, against the walls of the compartment; but the gas in passing through a compartment only passes under the trays; then through the spray; and then over the trays to the next compartment. The principal feature of the appliance is the construction of the agitators, whereby the water is caused to be sprayed between the trays or plates, and the gas to pass between.



Fiddes's Gas Washer or Scrubber.

The apparatus (as shown) is in the form of a round tower or column having several superposed compartments; the floor of each being provided with a central opening having a wall around it. Down through the openings in the floorings is passed a vertical shaft, which carries agitators or beating appliances constructed with top plates which fit round the shaft and are secured to it with plates—preferably of the same diameter, but having central holes with flanges or walls upstanding from their inner edges and secured to the top plate and below it by distance-pieces.

There is one of these agitators or beaters in each compartment. They are fixed to the vertical shaft so that they can be revolved by the pulley A. The top and bottom compartments do not contain an agitator; but the opening B of the lower compartment is made in the form of a stuffing box, which encircles the shaft and forms a tight joint to prevent any escape of gas. Valves are provided in the branch pipes C connecting each compartment with a pipe for running off the liquid in the bottoms of the compartments when desired—the pipe being in connection with the draw-off pipe of the bottom chamber, which is connected with the outflow pipe by a seal-pipe D.

The gas to be treated is passed into the bottom of the tower at E, and the water to wash it is passed in at the top compartment of the tower by the seal pipe F. The wall in the flooring of each compartment retains some of the liquid—thus forming a weir for the transfer of the liquor from one compartment to the next, while the liquor in each compartment is also fitted into the troughs of the agitators while the apparatus is at work. Thus the water, before finally leaving the apparatus, is acted upon by the gas many times, and so becomes thoroughly impregnated.

The agitators or beaters are revolved at considerable speed, and the liquid overflowing from the wall of one compartment into the next below falls on to the top plate within the central angled ring, and at the same time the liquid in each compartment is being driven up the bent pipes shown into the central trough. The centrifugal action causes this liquid to spread outwards, ride up the angled sides of the rings, and strike the depending rings on the underside of the floors and plates. It is thus diverted into or against the angled wall of the next outer trough, and so on against each angled wall until it strikes the outer wall of the chamber, where it trickles down on to the floor, to be collected in the wells formed by the wall and the sides of the casing.

This centrifugal action, it is said, thoroughly breaks up the water into fog or fine spray, and gas, in flowing from the bottom to the top of the apparatus, passes up through the central holes in the lower plates and then zig-zags through between the plates and over the top plate to the next compartment, and so on to the top of the apparatus, where it is passed away by the outlet G to the purifiers.

Regenerative Gas-Furnaces.

SIEMENS, F. K., of Queen Anne's Gate, Westminster.

No. 17,956; Aug. 6, 1913.

This invention consists of a modification of the regenerative gas-furnaces described in patent No. 10,824 of 1912.

In these furnaces the furnace bed or hearth was described as being heated by a uni-directional flame; the heat required for the regenerator chambers being obtained by diverting part of the heating gases going to the furnace. According to the present invention the division into furnace-heating and regenerator-heating gases is effected prior to the admixture and combustion of the combustible gas and air supplied to the furnace, by the diversion of a portion of one of the constituents of the combustible mixture on its passage from the hot regenerator chamber to the furnace so as to combine with a portion of the other

constituent so as to heat the cold regenerator chamber. The relative volumes of gases used for heating the furnace and the regenerator respectively are determined (without the use of controllable dampers) solely by the correct regulation of the chimney draught and the dimensioning of the ports by which the air and gas are diverted to heat the regenerator.

The invention may be applied to furnaces of many types, and is described in the specification, by way of example, with reference to a heating furnace having a long hearth, the finishing end of which is heated to a high temperature, while the end through which the things to be heated are charged is at a comparatively low temperature.

APPLICATIONS FOR LETTERS PATENT.

12,198.—Lewis, G. P., "Gas manufacture." May 18.

12,256.—Glasgow, A. G., "Regulating the temperature of combustion." A communication from J. M. Rusby and J. H. Taussig. May 18.

12,257.—Glasgow, A. G., "Controlling combustion." A communication from J. M. Rusby. May 18.

12,267.—Frederick, H. A., "Gas-generators." May 18.

12,273.—Altman, J., and Wholesale Fittings Company, Ltd., "Air regulators for burners." May 18.

12,276.—Haslam, Sir A. S., "Regulating the flow of liquid." May 18.

12,281.—Leach, A. L., "Acetylene generators." May 18.

12,400.—Wollaston, T. R., "Gas-producers." May 20.

12,431.—Harsant, H., "Compressing gas." May 20.

12,441.—Hansford, J., and the Hansford Meter Company, Ltd., "Prepayment mechanism for meters." May 20.

12,454.—Cadman, J., "Absorbent medium for carbonic acid gas." May 20.

12,463.—Glasgow, A. G., "Purifying gas." A communication from C. J. O'Donnell and A. F. Kunberger. May 20.

12,492.—Hathaway, S. C., and Hill, J. W., "Taps for gas-burners." May 21.

12,545.—Lewis, E., "Gas-fired furnaces." May 21.

12,549.—Titley, J., "Preventing leakage in pipes." May 21.

12,552.—Sandford, H. A. & H., "Caulking joints." May 21.

12,582.—Gibbons, W. P., and M'Ewen, C. J., "Producer furnaces." May 22.

12,593.—Richmond Gas Stove and Meter Company, Ltd., and Jones, S. F., "Gas-grilling-apparatus." May 22.

12,595.—Harland, W., "Gas-ovens." May 22.

12,610.—Kroeber, T., "Measuring flow of liquids." May 22.

12,639.—Miller, S., "Pumps and exhausters." May 22.

12,676.—Schubert, O., and Bergmann, A., "Dry gas-meter." May 22.

12,680.—Ciselet, E., and Deguide, C., "Extraction of sulphur from distillation gases of coal." May 22.

12,704.—Gorett, P. B., "Divided socketed pipe-joint." May 23.

LEGAL INTELLIGENCE.

LIGHTING AGREEMENT DISPUTE AT SWANSEA.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Thursday, May 28.

(*Before Mr. Justice* Warrington.)

Swansea Gaslight Company v. Swansea Rural District Council.

In this case plaintiffs claimed a declaration that an agreement dated Nov. 5, 1909, was still in force, and binding upon the parties. They also asked for an injunction restraining defendants from repudiating the agreement and from applying to the Magistrates to settle other terms. The plaintiff Company was originally incorporated by the Act of 11 Geo. IV., chap. 17, for the purpose of supplying gas within the town of Swansea. By the Swansea Gas Act, 1861, the Act of Geo. IV. was repealed; and the Act of 1861 provided that the Gas-Works Clauses Act, 1847, should be incorporated therewith; that the limits of the Act should include the town and borough of Swansea, and all places within a distance of one mile; and that, notwithstanding the repeal of the Act, the plaintiff Company should remain and continue incorporated by the name of the Swansea Gaslight Company. By section 49 the maximum price to be charged for gas was fixed. By a Provisional Order made by the Board of Trade under the Gas and Water Works Facilities Act, 1870, it was, by clause 28, provided that the price to be charged for gas supplied to consumers by meter should not, as regarded gas supplied within the borough of Swansea as existing at the passing of the Act confirming the Order, exceed 3s. 6d. per 1000 cubic feet, and as regarded gas supplied outside the borough 5s. per 1000 cubic feet; and that so much of section 49 of the Act of 1861 as prescribed a higher maximum price should be repealed. By the Swansea Gas Act, 1898, it was provided that, from and after the passing of the Act, the price for gas within the borough as extended by the Swansea Corporation Act, 1889, should not exceed 3s. 6d. per 1000 cubic feet. By an agreement made between the plaintiffs and the defendants it was provided that the Company should extend their mains to certain roads in the parishes of Llansamlet and Close Rural, and should supply gas to the public lamps of the defendants upon certain terms mentioned in the agreement, and that during the continuance of the agreement the defendants should not put in force the powers conferred upon them by the Llansamlet Electric Lighting Order, 1908, so far as concerned the supply of electrical energy for street lighting, private consumers, or other lighting purposes within that portion of their district agreed to be lighted with gas under the provisions of the agreement, and that they would not during the period substitute any other method of lighting for gas supplied by the plaintiff Company; but nothing in the agreement should prevent the defendants at any time putting in force the Order for power purposes. By clause 20 it was provided that the agreement should remain in force for a term of 25 years. Some of the roads referred to in the agreement were outside the area within which the plaintiffs had power to supply; and by the Swansea Gas Order of 1910 it was agreed that the limits should be extended, the price for gas within a distance of one mile of Swansea should be the same as that charged within the existing borough, and the price at a distance outside that radius should, except in the parish of Oystermouth, not exceed by more than 4d. per 1000 cubic feet the price for the time being charged within the borough of Swansea, and that plaintiffs should also extend their mains along certain roads in the parishes of Cockett and Penderry. Relying upon the agreement, plaintiffs had incurred very considerable expense in laying mains and running service pipes from the mains to the lamps for the lighting of the roads, and had for some time past been providing light upon the terms of the agreement. The defendants contended that the effect of the Order of 1910 was wholly to supersede the agreement, and to release them from liability thereunder. They claimed that they were no longer bound by its terms, and that they were now at liberty to put in force their power for supplying electrical energy for lighting purposes within any portion of the district agreed to be lighted with gas by the plaintiffs. Defendants had in fact wholly repudiated the agreement, and had sent to the plaintiff Company the draft of a new agreement containing very onerous terms on plaintiffs. They threatened to apply to the Magistrates to settle the terms upon which gas should be supplied, unless plaintiffs accepted the terms of the draft. Moreover, in breach of clause 16, they had begun to lay down cables for the supply of electricity in districts served with gas by the plaintiffs. The defendants contended that the agreement of Nov. 5, 1909, was *ultra vires* and void, as at the date of the agreement they had statutory authority to generate and supply electrical energy for lighting and other purposes within the parish of Llansamlet, but not within any other parish; further, that, if the agreement of November, 1909, was not determined, the same was not in any respect altered by the Gas Order of 1910. The defendants also denied that they had committed any breach of the agreement, or been guilty of any improper conduct. They relied upon the provisions of the Public Authorities Protection Act, 1893, and all such provisions of the Statutes for the limitation of actions and disputes as might be applicable.

Mr. George Cave, K.C., and Mr. Percy F. Wheeler appeared for the plaintiffs; Mr. Clauson, K.C., and Mr. Tomlin, K.C., represented the defendants.

Mr. Cave said the action arose out of an unfortunate dispute between the plaintiffs (who had the power of lighting Swansea and the surrounding districts with gas) and the defendant Council. The claim was to have it determined whether an agreement of Nov. 5, 1909, was still in force, except so far as varied with regard to the price of gas, and for an injunction in respect of part of the breach. Since the agreement was entered into, the price of gas had been varied by a Provisional Order, and also with regard to incandescent light by correspondence between the parties. The defendants said it had gone altogether. The first question was whether it had gone altogether, and, next, whether it had gone as to a particular clause which prevented defendants from supplying electric light in the districts lighted by gas. The defendants said the whole agreement had gone. In any case, their agreement not to compete under their electric lighting power was invalid, and, even if valid, had been set aside by a special arrangement. The plaintiffs attached importance to the whole agreement even without the restrictive clause. Counsel then stated the facts of the case as above set forth, and submitted that plaintiffs were entitled to the relief claimed.

Mr. Clauson said his contention was that the Court would not enforce the agreement as against a public body when statutory powers had been placed upon them for the benefit of that portion of the community which was placed under their sway. A public body could not covenant effectively that they would not exercise a trust vested in them by Parliament for public purposes.

The further hearing was adjourned till next term.

Alleged Wrongful Dismissal of a Stoker.

Last Wednesday at Lichfield, Edward Molyneaux, a gas-stoker, summoned the Brownhills Gas Company for alleged wrongful dismissal, involving him in the loss of £3 17s. 6d. The Company counter-claimed for £1 2s. 4d. Complainant said he was discharged owing to a dispute with the Manager about the retorts. Mr. J. H. Willoughby, the Manager, said complainant refused to obey him, and discharged himself by leaving the works of his own accord. The case was dismissed; the Chairman (Mr. A. O. Worthington) remarking that it was a very intricate one. Molyneaux was ordered to pay the amount of the counter-claim and costs.

Manchester Apprentices' Strike.

At the Manchester Police Court, last week, before the Stipendiary, Messrs. R. & J. Dempster, of Miles Platting, summoned six apprentices for wrongfully leaving their employment. The sureties of the apprentices were also summoned for failing to observe the covenants of the apprenticeship deed. It was stated that they absented themselves from work for two days, but then returned, having apparently been advised by a trade union official that they were in the wrong. By reason of their conduct the firm suffered actual loss amounting to £3 (without reckoning anything for loss of profit). The lads said they struck because they thought the apprentices, as well as the men, should be paid "dirt money"—money given as a sort of recompense for doing dirty work. The Stipendiary remarked that the firm had certainly placed the loss at a nominal figure; and there would be an order against each of the defendants (surety and apprentice) for 10s., as claimed. No application was made for special costs.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Private Bills:—

The Walsall Corporation Bill was brought from the Commons, read the first time, and referred to the Examiners.

The Tees Valley Water Bill and Local Government Provisional Orders (No. 6) Bill were read a second time and committed.

The Kidsgrove Gas Bill and Ashington Urban District Council Bill were reported with amendments.

The Longwood and Slaithwaite Gas Bill, Rhymney and Aber Valleys Gas and Water Bill, Manchester Corporation Bill, and Gas Light and Coke Company Bill were read the third time and passed.

Several petitions, including one by the Darlington Corporation, have been presented against the Tees Valley Water Bill.

HOUSE OF COMMONS.

The Longwood and Slaithwaite Gas Bill, Rhymney and Aber Valleys Water Bill, Manchester Corporation Bill, and Gas Light and Coke Company Bill were read the first time and referred to the Examiners.

The Reading Corporation Bill was read a second time and committed.

The Walsall Corporation Bill was read the third time and passed.

A Scotch Gas Order Confirmation Bill.

A Bill, "to confirm a Provisional Order under the Private Legislation Procedure (Scotland) Act, 1899, relating to Dundee Boundaries Extension and Gas," was presented by Mr. M'Kinnon Wood in the Lower House.

KIDSGROVE GAS BILL.

This Bill was on Monday of last week before the Unopposed Bills Committee of the House of Lords. It has been passed by the House of Commons; the Committee proceedings in that house being reported in the "JOURNAL" of March 24 (p. 841). The only alterations in the Bill since then are that some slight additional protection has been given to the Cheshire County Council; and the clause prohibiting the use of discs and unsuitable coins in prepayment meters has been taken out by the Lord Chairman.

Mr. LEES (Messrs. Lees and Co., Parliamentary Agents), referring to this latter point, said that there had been trouble with consumers in the district, who used discs and tokens in the prepayment meters; and the Company had lost money as a consequence. It was in view of this that the following clause had been drafted and put into the Bill before it left the House of Commons:

> Any person who causes or suffers to be placed in any prepayment meter (as defined in the section of this Act of which the marginal note is "Charge for Gas Supplied by Means of Prepayment Meters") belonging to the Company any disc, token, coin, or thing other than a coin of the value and denomination for which the prepayment meter is designed and intended, shall be liable to a penalty not exceeding twenty shillings.

When the Bill was before the House of Commons, the Home Office reported that the Committee should give this matter very careful consideration, as there was no precedent for it, and that it might be possible to deal with the matter under the Gas-Works Clauses Act, 1871, or as simple larcency. The House of Commons Committee, however, passed the clause, and were apparently satisfied that the matter could not be dealt with in the way suggested by the Home Office. The only instance in which the offence of putting tokens or discs into automatic machines had been dealt with as simple larceny was in the case of two boys who were seen to put them into such a machine on a pier; and they were caught in the act. But in the case of a prepayment gas-meter the person could not be caught in the act, and therefore could not be proceeded against for simple larceny.

Mr. GREY (Counsel to the Lord Chairman) asked how the clause would allow the Company to get at the offender more effectively.

Mr. LEES replied that under the general law it was necessary to prove intent; but it was impossible to prove this when the coins were not collected until several weeks after they had been put in. On the other hand, it was believed by the Company that if they had the clause, which imposed a penalty, the mere knowledge of it would have its effect upon the consumers, and deter them from committing these acts.

Mr. GREY said that the words "causes or suffers" were very vague, and had occasioned in other cases the greatest possible difficulty in criminal law.

Mr. LEES said that if a man told his child to put in a disc, he caused or suffered the act to be done.

Mr. GREY said in that case the parent would be the one who would be held to have done the a t.

The CHAIRMAN said there would clearly be the same difficulty as at present.

Mr. LEES said he would be content if the word "suffers" was taken out of the clause. He only wanted words which would stop these offences.

Mr. GREY: You are then in exactly the same position as now. If this clause puts you in a better position, there is something to be said for it.

The CHAIRMAN: Your only remedy would seem to be to take the meter away.

Mr. LEES: Then we should not get any customers.

The CHAIRMAN: I am afraid we cannot allow the clause.

The Bill was then ordered to be reported for third reading.

ASHINGTON URBAN DISTRICT COUNCIL BILL.

HOUSE OF LORDS COMMITTEE.—Monday, May 18.

(*Before Lord* LAMINGTON, *Chairman, Earl* CHICHESTER, *Lord* ERSKINE, *Lord* SLIGO, *and Lord* FARRER.)

This Bill is for the purpose of authorizing the Ashington Urban District Council to establish gas-works, and to purchase certain portions of the gas undertaking of the Ashington Coal Company. The Bill has already passed the House of Commons [see "JOURNAL" for March 17, p. 751].

Mr. HONORATUS LLOYD, K.C., Mr. HOLMAN GREGORY, K.C., and Mr. WROTTESLEY appeared for the promoters on this occasion. The only opponent, as in the other House, was the Ashington Coal Company, who were represented by Mr. VESEY KNOX, K.C., Mr. ST. JOHN RAIKES, and Mr. JACQUES ABADY.

Mr. HONORATUS LLOYD, in explaining the objects of the Bill, detailed the history of gas supply in the district, which was already given in the other House. Briefly it is that some forty years ago the Ashington Coal Company constructed gas-works upon the premises for their own purposes. The supply was gradually extended to the colliery houses, with the result that at present there are some 200 consumers on the gas-mains, most of whom are men employed by the Coal Company. The price charged is 4s. 9d. per 1000 cubic feet. The works are very small, old, and out of date. They stand in the rate-books at an assessable value of £51—a figure which would give an indication of their size. This condition of affairs existed until 1902, when the Northern Counties Electricity Supply Company came into the district and obtained the Council's sanction to the promotion of an Electric Lighting Order; the understanding being that the Company would erect their own generating station, and that, as a result of competition, there would be a general improvement in the lighting. Instead of doing so, however, the Northern Counties Electricity Company actually entered into an agreement with the Ashington Coal Company (who, meanwhile, had erected a small electrical generating station for their own purposes) to take from them such current as could be spared for the purposes of giving a public electricity supply. But this arrangement had been a melancholy fiasco. At the time the Council sanctioned the Company's promotion of the Provisional Order, an arrangement was entered into for the electric lighting of the streets. At the present time there was only one gas-lamp in the streets; but it had been found impossible to get the Electric Company to extend the public electric lighting except upon excessive terms. At one time the Council were asked to pay £500 towards the cost of laying the necessary mains, and, later on, the sum of £2200 was quoted for a complete electric lighting scheme, which was afterwards reduced by £500 immediately the Council had decided to promote the present Bill. It was found during the proceedings in the House of Commons that one of the terms of the agreement between the Northern Counties Electricity Supply Company and the Ashington Coal Company for the supply of electricity was that the latter should not push the sale of gas—in fact, this had been the actual position since 1902. All the miners' houses belonging to the Coal Company had been wired for electricity; but so unsatisfactory had the supply become that a few years ago the Newcastle Electric Supply Company entered into an arrangement with the Northern Counties Company whereby they "operated" the latter Company's undertaking. Since this had come about there had been some improvement in the supply; and the wiring of houses was going on more rapidly. Nevertheless, complaints were still being made. Whenever the Council approached the Coal Company with regard to the supply of gas they were referred to the Electricity Company; and apparently the Coal Company were under the impression that the inhabitants of the district should not be allowed to choose which illuminant they should use, and that, having entered into an agreement with the Electricity Company, they should do everything to prevent a supply of gas being given. It was in these circumstances that the Council was advised to establish gas-works, and also to see if it were possible to purchase the Northern Counties electricity undertaking. The latter Company, however, pointed out that they were under no obligation to sell until 1941. It was therefore decided to abandon the idea and establish gas-works. When the Company decided to promote the Bill, they inquired of the Coal Company whether they would allow gas-pipes to be laid in the miners' houses on their property. But it was found this was impossible under the terms of the agreement with the Electricity Company; and a letter asking whether the prohibition applied to some new streets on the Coal Company's property which were not yet wired had never been answered to this day. Since the Bill was in the other House, a further canvass of the district had been made, with the view of ascertaining the exact feelings of the inhabitants on this question of the Council giving a supply of gas. There were 5563 inhabited houses in the district. Of these, 4255 had signed papers in favour of the municipal gas supply, and only 200 had refused to sign them. The Bill proposed to supply Ashington and the neighbouring districts of North Seaton, Pegswood, Bothal Demesne, Sheepwash, Ellington, Cresswell, and Woodhorn. In the other House, it had been suggested that the Ashington Council were entering upon an undertaking which could not possibly be made to pay, and which must be unsatisfactory and fall heavily upon the rates, of which the Coal Company paid 50 per cent. It was with a view to meeting this suggestion that new evidence would be called. It had been stated that where free coal was given to miners there was no inducement for them to use gas-cookers and boiling-rings; but the evidence would be to the effect that, in spite of free coal, there was a considerable number of cookers and boiling rings in use in districts similar to Ashington, and that a very substantial quantity of gas was used. The maximum price in the Bill was 4s. 6d. per 1000 cubic feet within the district of Ashington, and 5s. in the outside areas, in several of which considerable colliery developments were taking place, and a large demand was anticipated in the near future. It was, however, expected that the Council would be able to supply at 3s. 6d. in Ashington. In the petition of the Coal Company it was stated that

they were willing to modify the agreement with the Electricity Company in order that gas should be supplied in the houses on the Coal Company's property not already wired. But in the houses at present supplied the Colliery employees were not apparently to have the option of taking gas if they wanted it. Bearing on the general allegation that the Council were not justified in their estimates as to the cost of the scheme, Counsel referred to the question of land, which in the other House was put down at £330. The Coal Company alleged that it would cost £4300. In order to test this, negotiations had been opened up with the owner, the Duke of Portland, since the proceedings in the other House; and he had agreed to sell for £860—£360 for land, £300 for loss of coal, and £200 for depreciation in value of land in the neighbourhood. Therefore, the estimate for the land was near the mark. An objection in the petition was to clause 14, under which the Council proposed to purchase the mains and apparatus of the Coal Company off the colliery premises at a price to be agreed or settled by arbitration, and, in addition, to pay compensation to the Company in respect of loss sustained by reason of their ceasing to supply gas to the houses now supplied by them. The figure of compensation was also to be agreed or determined by arbitration. Apparently the Company required the Council to purchase the gas-works as well; but as they were on the Colliery property this was impossible, as had been admitted by their witnesses in the other House. Objection was taken by the Coal Company to the maximum price, which was regarded as too low; while the allegation was also made that there was no scope for gas and electricity in a district such as Ashington. In districts adjoining this one, however, both supplies were being given, although the miners preferred gas, quite apart from the question of price.

Mr. *Charles Alderson*, Clerk to the Urban District Council, said that although the Council understood that the Northern Counties Electricity Company would erect a separate generating station, this had not been done, and the Council had not been notified of what had actually been arranged between the Electricity Company and the Coal Company. He confirmed the general facts already spoken to relating to the public lighting, and justified the proposal to go into the outside districts on the ground that there are considerable colliery developments to be anticipated in the near future which would necessitate the building of a large number of houses.

Mr. VESEY KNOX, in his cross-examination, put it that the Colliery Company had to all intents and purposes made the town of Ashington and at present paid 50 per cent. of the rates. No municipal trading had yet been undertaken by the Council; and the result was, he put it, that Ashington is the lowest rated town in that part of the country. Mr. Alderson was not disposed to accept this, and complained of the agreement not to push gas, which had come as a surprise to the Council when the Bill was before the House of Commons. Would there be any objection, said Counsel, to this arrangement if the Newcastle Electric Supply Company made it possible to give a supply in the district from the large system of electric mains it owned, and so give an ample supply of light at the very cheap rate now charged in Newcastle—viz., 2¾ per unit? Witness said it was now too late.

The CHAIRMAN: Why too late?

Witness said this matter had been under consideration for several years, and the Council had been compelled to promote this Bill.

Mr. VESEY KNOX said that the Electric Supply Company was wiring a large number of additional houses, and by the time the Council's gas scheme got to work there would be very few houses not wired. Where would the Council's business come from? Witness said the whole feeling in the district was in favour of gas, and especially for a griller or boiling ring by which the men, who had to come and go at all hours of the day and night, could get their meals quickly. As to the free coal which was supplied being a factor against this proposition, it was pointed out that, although it was free, it was of very bad quality and difficult to make a good fire with quickly.

Other questions related to the calling in of Mr. Arthur Valon to advise as to the position with the Electric Company, and Mr. Vesey Knox suggested that it was hardly likely Mr. Valon would do otherwise than recommend the erection of a gas-works. Witness replied that the Council had complained so many times as to the inadequate supply of gas and absence of competition, that it was felt something should be done. It was now the intention to put in gas-fittings with slot meters wherever they were asked for, whether the houses were wired for electric light or not.

In re-examination, Mr. Alderson said the houses which were wired for electricity were mainly on one side of the town where the colliery was. There were a very large number of houses where neither gas nor electricity was available, and where oil had to be used. Since 1905, the district had doubled in population; but in spite of requests by the Council, the Electricity Company would not increase the number of public lamps.

Mr. *John Craigs*, a member of the Council, said the supply of electricity to the town had always been a subsidiary matter with the Company; the supply of current for colliery purposes being the first consideration. There was no competition. As a user of electricity, he was not prepared to say that the quality of the light was bad since the Newcastle Company took over the Northern Counties Company.

Mr. *G. H. Warne*, a miner, and also a member of the Council, said there were 2357 houses there burning oil; and of the few houses which were wired for electricity, some tenants had done away with it on account of its unsatisfactory nature. His opinion was that the private and public electric lighting was still bad, and it was the almost unanimous wish of the miners that there should be a municipal gas supply. It had been stated that the Electricity Company was wiring a further 600 houses; but an inspection a few days ago showed that only one or two streets were being dealt with. He objected to the system by which payment for the electric light in miners' houses was deducted from wages, and would prefer the prepayment system.

In cross-examination, witness agreed he had never asked to be changed over to the prepayment system himself; and Mr. Raikes, for the Coal Company, said the Electricity Company itself was anxious to change the present arrangement of deducting from wages, and to instal the prepayment system absolutely. It was put to witness that the cost of cooking by gas would be more expensive than by free coal; but the reply was that the advantages of cleanliness, &c., counterbalanced this. On the question of the poor quality of the electric light, complaint was made that the effect of the opening of the theatres was noticed in a diminution of the light, which improved after 11 p.m., when the theatres closed. But it was then, of course, useless for ordinary domestic purposes.

Mr. *Willie Tapson*, the Secretary of the Miners' Lodge in Ashington, gave similar evidence.

Tuesday, May 19.

Mr. *J. Howey* was called this morning to prove the taking of the census since the Bill was before the House of Commons. The number of householders using electricity was found to be 3022, gas 137, gas and electricity 47, and those using oil alone 2357. While he was making the canvass, he received some 200 inquiries from persons who desired gas-cookers installed.

Mr. VESEY KNOX, in cross-examination, pointed out that the figure of 137, representing the number of persons using gas, was something like 100 below the number of consumers on the Coal Company's books who actually paid for gas.

Evidence was next given by two miners as to the demand for gas in the districts of North Seaton and Pegswood.

Mr. HOLMAN GREGORY, for the promoters, also handed in two resolutions carried respectively by the Ashington and Hirst Traders' Association and the Ashington and Hirst Ratepayers' Association in favour of the Bill.

Expert evidence was then called.

Mr. *Arthur Valon*, who was consulted by the Council in the first instance in 1910, said there was no possibility of giving an adequate supply of gas in the district from the Coal Company's works. The public lighting by electricity also was by no means adequate. Most of the lamps were supposed to be 50-candle power metal filament lamps; but as far as one could judge by the eye they were not giving the light they should do. There were 218 such lamps, and 84 petrol lamps. By common consent, however, between 700 and 800 lamps were required in the district to light it adequately. For the public lighting he did not believe that electricity could compete with gas, taking into account the character and cost of the light; while for a district of this kind he did not think that electricity could compete with gas for small houses. Since the proceedings in the other House, he had revised his estimates for the Council's gas-works, by reason of the figures given by the Coal Company. According to the evidence in the House of Commons, the Coal Company sold 5,455,000 cubic feet of gas per annum, and had 240 consumers. He had therefore taken this as a basis, and also the figure of 4255 people who had expressed a desire to have gas as the result of the second canvass of the district. From these, however, he had deducted the 240 existing consumers, as he imagined these were included in the total. This left 4015 extra consumers to come on to the mains; and taking 7500 cubic feet per consumer, which was a very small amount, he arrived at a total annual gas consumption of 30,112,500 cubic feet. After adding public lighting, the annual output of the works would have to be 40,568,000 cubic feet. This output, he was confident, would be required within one or two years, quite apart from the natural increase in the district which he anticipated would take place. Last year 240 new houses were built; and there might possibly be another 4 million cubic feet of gas per annum consumed in North Seaton and Pegswood. But he had not taken any credit for this in his estimates. In the other House he had put the estimated cost of the works at £40,000 for 2000 consumers; but having regard to the later figure of 4255 possible consumers, he would have to add another £6500 for fitting up the houses of these extra consumers. There would also have to be added the difference between the £333 included in the previous estimates for land, and the £860 at which it was to be bought. Under the Bill as originally drafted, the Council was asking for borrowing powers of £40,000 for works and £1000 working capital; and these figures would have to be increased accordingly. The price he proposed to charge was 3s. 6d. per 1000 feet for ordinary consumers, and an extra 8d. for slot meters. This was less than usual; a common figure being 10d. Taking a sale of 40 million cubic feet per annum at 3s. 6d., a gross profit of £4593 was arrived at. Deducting capital charges on the basis of a 40 years' loan for works, 20 years for services, meters, slot meters, fittings, &c., and 10 years for working capital, there was a net profit of £1556, which in the first year or two would be available for paying the interest on the amount which would have to be borrowed for the purchase of the Coal Company's mains, &c., and also for compensation to be paid them.

Mr. ABADY cross-examined at some length; his first and most important point being that the Council apparently expected to obtain 4000 consumers out of a total of 5300 houses, a very large proportion of which were already wired for, and were taking a supply of, electricity. Witness agreed that he knew of no place comparable with Ashington in this respect; but there were towns of a mining character where gas was taken by 75, and even up to 92, per cent. of the houses. He had included a figure of £4 as the cost of piping a house, including the service, meter, fittings, and a small griller, but no cooker. He anticipated putting in three lighting points per slot-meter consumer, and supplying one incandescent burner and two flat-flame burners, or probably three incandescent burners. He was confident the figure of 7500 cubic feet per consumer per annum would be nearer 10,000 feet; but he had taken the lower figure in order to feel absolutely on the safe side. In Morpeth the consumption was 9000 feet per consumer, in spite of the fact that the miners there also had free coal, as in Ashington.

Mr. ABADY: Do you expect the present electric light consumers, who get a 50-candle power metal filament lamp free, and three other points to which they can attach any lamps they please, to throw out electric light (which costs them only a few pence a week) and take gas?

Witness: I think we can give the service very much cheaper with gas in such small houses as these.

Mr. ABADY, continuing his cross-examination, pointed out that at present the average return from the slot meter electricity consumers

was only £1 per annum, and £1 19s. 3d. from those consumers taking an unlimited supply. According to witness's estimates, the average figure for gas would be 31s. per annum; whereas the Electric Light Company, who were changing over to the slot-meter system all round, anticipated that their average figure would be £1 7s. 6d. Witness replied that in the case of gas the consumer would be getting more for his money. He also pointed out that, whereas Counsel was taking the average of the electrical consumers only, the figures in his (Mr. Valon's) estimates were an average of the whole district, including the large and small consumers.

Mr. ABADY: If you are confident of these estimates, have you any objection to a clause providing that there shall not be a loss on the undertaking, and that the charges should be adjusted accordingly?

Witness said he had two objections. One was to the principle of the suggestion, because such a clause had never been applied to a gas undertaking before, and the second was that the competitor of the Council would be the very strong Newcastle-on-Tyne Electric Supply Company, whom it might pay to supply current at a loss for a time in order to cripple the Council's undertaking, although he did not suggest that they would do this. If the supply of electricity in the district was given by the Ashington Coal Company only, or by a small independent company, he would have no objection to the suggestion that the "Northumberland Clause" should be put in the Bill. In his estimates he had allowed for sixteen miles of mains for street lighting. Counsel pointed out, however, that some twenty miles would be required.

In re-examination, witness said that no gas engineer looking at the district generally could come to any other conclusion than that it should be supplied at a profit.

The CHAIRMAN: Assuming that you take out all the electrical fittings?

Witness said no. He could start in a small way, because there were over 2000 people using oil to-day in Ashington, and with this number of consumers on his original estimates the scheme should be made to pay.

Mr. *E. H. Stevenson* said this was the first time he had ever heard it suggested that competition between gas and electricity should not be permitted. Competition had been the salvation of gas undertakings generally. The capacity of the existing works in Ashington was only 35,000 cubic feet per day, and was quite inadequate to properly meet the demands of the district. As to the use of cookers and grillers in mining districts, he had had considerable experience of these in South Wales, and was of the opinion that the development of their use was entirely dependent upon the manner in which the miners were approached. He had in mind two cases in which 68 per cent. and 65 per cent. respectively of the consumers used cookers. On the other hand, in Aberdare 47 per cent. of the consumers used them; while in Mountain Ash, a coterminus district, only 13 per cent. used cookers and grillers —thus proving that it depended upon the manner in which the consumers were approached and the facilities granted, as to the degree in which these appliances were used. He agreed absolutely with Mr. Valon's figures except in one item, with which he disagreed altogether; and that was the quantity of gas likely to be taken per consumer in the district. He was perfectly certain that a considerably larger quantity would be sold than the 7500 cubic feet assumed by Mr. Valon. In nearly all mining districts of this country there was an average consumption of from 15,000 to 18,000 cubic feet per consumer, including public lighting; and there was no reason whatever why this district should be different from the others. All the arguments now put forward against the Ashington Council were put forward against the Annfield Plain Gas Company—in that case by the Council. But the average consumption in 1913 had reached 10,000 cubic feet in that case; and he had no hesitation in saying that at the end of the second year in Ashington the works would be profitable.

In answer to Mr. RAIKES, in cross-examination, witness said he was convinced that the Electricity Company had not satisfied the people in Ashington, and as many people would take gas when the Council's works were started as if there were no electricity supply at all. The Annfield Plain figure of 10,000 cubic feet per consumer had been reached after six years; but it had been very near it for several years. In that case 94 per cent. of the consumers were on the slot system.

Mr. *Frank Jones*, who also corroborated the previous expert evidence, said he knew of no other place with a population of 30,000 without a gas supply. Gas was wanted in all communities of this sort nowadays; and the necessity was greater in the case of a working-class population than in better-class districts.

Cross-examined by Mr. VESEY KNOX, he agreed that he knew of no place in which there was such a large proportion of workmen's houses wired for electric light; but there was in his opinion plenty of room for both in a town such as Ashington. The average weekly bill of a slot consumer was 7d.; and he believed the women of the families would prefer to pay this for gas on account of its convenience for cooking, in spite of the fact that they had coal free.

Mr. *William Cash*, speaking as Secretary of the Houghton-le-Spring Gas Company, gave evidence to prove that miners were keen on taking a supply of gas through slot meters, and also on using grillers and cookers. The average consumption in Houghton-le-Spring was about 7300 cubic feet per consumer in the case of those consumers who had only been connected about twelve months; but the Company was only about half the size of the proposed Ashington undertaking.

Mr. VESEY KNOX, in cross-examination, put it to witness that, although he had never been either to Ashington or Houghton-le-Spring, he said the two places were similar. Witness replied that they were similar in that they were mining districts.

Some discussion took place with regard to Mr. Valon's figure of 1s. 1½d. per 1000 cubic feet as the working expenses; but witness argued that this was a fair figure to take, and mentioned a number of other cases of similar outputs where they were less. It was suggested to witness that some 220 grillers had been returned; but he contended that, reading through the report of the local manager, it only appeared that they were taken out of some houses where they were not required, and put in others where they had been asked for.

Mr. *A. C. Fawcett*, the Manager of the Blythe Gas Company, in whose district the Northern Counties Electricity Supply Company also works, stated that of the 7123 houses in his district some 6500 were supplied with gas. Of these, 5500 were prepayment consumers. The average consumption was 8500 cubic feet per house. Notwithstanding the competition of the Electric Light Company, his undertaking had quite held its own in the miners' houses. In the neighbouring district of Cowpen, where his Company also supplied, the Electric Light Company were there first; but the Gas Company now supplied 180 houses in Cowpen; and last quarter the average consumption was 3000 cubic feet per house.

Mr. *R. Crawford*, the Chairman of the Morpeth Gaslight Company, in whose area again the Northern Counties Electricity Supply Company works, gave similar evidence.

The case for the Ashington Coal Company was opened by calling evidence.

Mr. *E. O. Southern*, the Agent of the Company, explained the general conditions under which the Company were working, and the large number of colliery houses which had been wired for electricity under the agreements with the Northern Counties Electricity Supply Company. In regard to the point that the Company had bound themselves not to push the sale of gas, he handed in to the Committee an undertaking in the following terms, by which the Coal Company agreed to be bound in the event of the Bill not passing: "The Ashington Coal Company, Limited, will supply with gas manufactured by them any house within the Ashington Urban District that may not be already wired for lighting by electricity, or is not to be wired under existing contracts, as though the Coal Company were bound by the Gas-Works Clauses Act; the price of gas so supplied not to exceed 4s. 6d. per 1000 cubic feet."

In the course of his examination-in-chief by Mr. ABADY, witness said that it was not putting it too high to say that the Coal Company practically "ran" Ashington. The real reason for the small sale of gas was that there had never been any demand for it on the part of the miners. At present there was 2481 colliery houses, of which 2388 were wired. Of a total of 5321 houses in the district, no less than 3929 were wired.

Mr. GREGORY cross-examined to the effect that there had not been any addition to the number of gas consumers for several years. Witness, however, said there had been some additions during the last twelve months at 4s. 6d. per 1000 cubic feet. Questions were also put by Counsel as to why the various offers should have been made by the Coal Company and by the Electricity Company since the Council had promoted their Bill. Witness answered that it was part of the Company's opposition to the Bill. Counsel commented that the question of giving a supply of gas at 4s. 6d. had never been mentioned until the Bill was before the present Committee. It was also pointed out that under the proposed undertaking, if the Company saw fit to wire all their houses for electric light, whether the tenant required it or not, they could prevent gas coming in. Witness replied, however, that the Newcastle Company had undertaken to wire over 635 new houses; and in each case contracts had been entered into with the miners.

Mr. *R. P. Sloan*, the Manager of the Newcastle-on-Tyne Electricity Supply Company, said that the Northern Counties Company and the Newcastle Company jointly had spent £40,300 upon the lighting of Ashington and Hirst, irrespective of an expenditure of £3800 which the Newcastle Company were committed to for free wiring the further 635 houses to which reference was made in the other House. Since January this year, 2700 yards of cable had been laid in the district. With regard to the additional 635 houses, he produced a number of application forms which had been signed by the occupants. In all, 437 application forms were signed for a supply of electricity in these houses. Of these, 176 had already been wired, and 50 were receiving a supply. Up to 1913, a sum of £9572 had been spent upon free wiring in the district; and when the houses now being dealt with were completed, over 70 per cent. of the houses would be wired for electric light. Since the Council's Bill had been introduced, he had offered to reduce the charge for current to ordinary consumers to 3¾d. per unit—which was the same as charged in Newcastle, and which was an exceedingly low price—to give a 50-candle power metal filament lamp and three carbon lamps free to slot-meter consumers, to free-wire an additional 635 houses, to carry out a public lighting scheme at £1700 (instead of £2200 as quoted at first), and to pay the costs of the Council in respect of the Bill up to date. He was still prepared to carry out these undertakings if the Bill did not pass. With regard to slot-meter consumers, the Company were quite willing to change any of the present unlimited supply consumers over to the slot-meter system.

In cross-examination by Mr. GREGORY, witness said that the Company had on their mains in Ashington 2000 unlimited supply consumers, and at present only a very small number of slot-meter consumers. He agreed that the public lighting was very bad; but this was because there was so little of it. The Council had for a long time been trying to get the public lighting improved without spending any money. The Newcastle Company supplied five other councils with current for public lighting, and in each case the council had found all the necessary capital expenditure. He agreed that he wanted to stop the Bill.

In re-examination, witness said that he regarded it as a serious matter that the Ashington Council should be allowed to come in and compete, and probably render useless the very large amount of capital expenditure put into the district, especially having regard to the fact that the Northern Counties Company came into the area with the consent of the Council. They were endeavouring to improve the lighting, and arrangements could be made for giving an alternative supply of current from the Newcastle Company's own system of mains at North Seaton. The offer to carry out the public lighting at £1700 would give the Company no profit whatever. He had only made it in order to save the expenditure put into the district in other directions.

Wednesday, May 20.

Mr. VESEY KNOX this morning informed the Committee that he did not propose to call any further evidence. Addressing the Committee on behalf of the Ashington Coal Company and also on behalf of the

two Electric Supply Companies, he said that the question of preamble seemed to be really the one point as to whether or not this was an unjustifiable attempt at municipal trading; and he was the more encouraged to ask the Committee to reject the preamble, because in the other House the Chairman had stated that the decision to pass the preamble of the Bill was not unanimous.

Mr. GREGORY: Without calling upon us to reply?

Mr. VESEY KNOX said that in some ways this case was a unique one. Ashington was a colliery district created by the Coal Company; and in all human probability the town, as such, would die when the coal had gone. A part of the district was held on a lease of only twenty years, and the other part was freehold.

Mr. GREGORY interposed to the effect that, although the lease of the Coal Company was for only twenty years, the life of the coal was very much longer. In the other House it was put at forty years.

Mr. VESEY KNOX said that, in addition, the Coal Company paid half the rates. The colliery houses, which formed a very large proportion of the district, were held by the miners as a condition of their employment; and the miners were therefore not affected in any way by a fluctuation in the rates. Thus it was that the greater part of the rates were paid by a single ratepayer—the Coal Company—who had no vote. He knew of no place similar to this throughout the kingdom. If the Committee were to choose the most dangerous body to entrust with powers for municipal trading, it would be a body constituted on such a basis as was the case in Ashington, where many members of the Council were employees of the Coal Company. He reminded the Committee that the Coal Company had been supplying a considerable quantity of gas, but argued that it was a reasonable thing for them to enter into the agreement with the electricity companies which had been referred to in the course of the proceedings, because the coal obtained at the colliery was not gas coal. On the other hand, the Company had large quantities of duff and other small coal, which was difficult to dispose of. It could, however, be readily used for the generation of electricity; and this was what had been done. It was interesting to note also, on the question of complaints, that the only witness called for the promoters who was not a miner—namely, Mr. Craigs—had admitted that he had no fault to find with the electricity supply since the Newcastle Company came on the scene. In his opinion, much of the evidence given by the miners was of a kind which ought not to have been given. The offer which the Newcastle Company had made in the way of reduction of price, &c., since the Bill was introduced was not a death-bed repentance, but a salvage offer in order to save the capital which had been expended in the district. If the Bill were not passed, every legitimate need of the district would be amply met without the expenditure of public money. On the other hand, the Council proposed to spend no less than £47,500, *plus* the costs of the Bill and the cost of buying out the Coal Company's gas undertaking—in the aggregate probably not far short of £60,000—mainly with the object of rendering valueless the £40,000 already spent in the district by the Electricity Companies. There was little doubt that considerable feeling had been worked up in the district against the Electricity Companies; and it was now proposed that the Council should spend money on the security of the rates for fitting up for gas houses which were held on tenancy by miners, who were to a large extent a shifting population. Moreover the houses were the property of the Coal Company, who would thus have to pay half of any loss which the gas undertaking might involve, a portion of which would be incurred through the fitting up of their own property against their will. He did not propose to go into Mr. Valon's estimates in any detail, but would call attention to one or two variations in them between the two Houses of Parliament. In the first House his estimates were for a sale of 30 million cubic feet per annum, with a profit of £3024. This, however, was not sufficient to meet interest and sinking fund charges, and so, apparently on the strength of a new canvass, which was not very different from the original one, Mr. Valon had increased the output to 40½ million cubic feet, and the profit to £4593. Similarly, the coal costs in the other House worked out to 10d. per 1000 cubic feet, whereas now they had gone down to 8d., and apparently the price of coal was falling rapidly. The question as between electricity and gas in the district was not one of a lower price, but merely that the inhabitants had been said to desire a change. He could not help regarding it as an experiment in municipal trading, because in the whole of Northumberland there was not another municipal gas undertaking; and there was no other place where a single coal company had to pay so great a portion of the rates, and, consequently, would have to bear a large proportion of any loss on municipal undertakings. He therefore asked the Committee to reject the Bill as an undue experiment in municipal trading, which would involve gross injustice upon the Electricity Companies, and which was in no sense justified by the circumstances of the case.

Mr. GREGORY, on behalf of the promoters, submitted that they had made out an overwhelming case for the Bill. Why was it an unjustifiable attempt at municipal trading? In this connection he reminded the Committee of the Public Health Act of 1875, by which any local authority was entitled to apply to the Board of Trade for a Provisional Order to undertake the gas supply in its area; and a large number of these Orders had been granted. The reason the Council had gone to Parliament by a Bill instead of, as they might have done, proceeding by Provisional Order, was that they desired to be fair to the Coal Company, and to purchase such portions of their gas undertaking as were possible, and also to compensate the Company for the loss of custom. This could not be done by Provisional Order; hence the Bill. Again, he ventured to suggest that no local authority with a population of 30,000 had such a small indebtedness as Ashington—namely, £6000—nor had such a low rate as 5s. 6d. in the pound, exclusive of the water-rate. The real facts of the case were that the Council had been driven to take the course they had taken and to promote this Bill in the interests of the ratepayers, because they could not get the supply of light and heat which such a community ought to have. The scheme was in no sense a hastily-considered one, because it had been openly discussed since 1910, and although the opponents were nominally the Coal Company, they were really the two Electricity Companies, who were trying to protect their own vested interests. He had never yet known of a case where, when a gas company was in existence, the Board of Trade had refused to sanction competition by electricity at the hands of the municipality; and he failed to see what distinction could be drawn between such a case and the converse, as in this instance—namely, with electricity established and gas desiring to come in to compete. If ever there was a case in which competition was necessary, this was one. It had been argued by the opponents that the undertaking could not be made to pay; but no evidence had been put forward. In fact, they had not dared to call their expert, Mr. Woodall (who had been in the room all the time) to controvert Mr. Valon's estimates. This, by all the rules of Committee proceedings, was held to be an admission that the promoters' estimates could not be challenged. The point that the capital of the Electrical Companies should not be endangered was one which he hoped the Committee would not consider. Both Companies had spent their money with their eyes open, and neither could be considered from this point of view for a moment. Furthermore, the Coal Company had entered into a contract with the Electric Lighting Companies under which it practically bound itself to refuse to supply any further gas—thus depriving the inhabitants of any choice in the matter of whether they would have electricity or gas.

The CHAIRMAN asked Mr. Gregory if he could point to any cases of refusal to supply gas.

Mr. GREGORY said that the agreement with the Electrical Companies was to the effect that the Coal Company should not push the sale of gas.

The CHAIRMAN asked for specific instances in which refusals had been given.

Mr. GREGORY replied that the greater portion of the town had come into existence since the agreement; and it was obvious that the Company were actually unable to supply gas, as their mains did not extend into the new district.

Mr. ABADY, interposing on behalf of the Coal Company, objected to Mr. Gregory replying to a question put by the Chairman in the form of argument. As to the refusal to supply gas, the evidence was that there had been no demand for it. He would like to remind the Committee that there was no agreement between the Coal Company and the Electricity Company not to supply gas—the agreement was that the Company should not extend its works.

Mr. GREGORY said it was admitted that the gas-works of the Coal Company were too small, and there was no question that the inhabitants could not get gas, because there were over 2000 houses in which oil was used.

The CHAIRMAN remarked that this did not quite answer his question.

Mr. ABADY said the Company were now released from the obligation not to extend its use. Moreover, the capacity of the existing gas-works was treble that of the actual quantity supplied.

The room was cleared; and when the parties were re-admitted,

The CHAIRMAN said: The Committee are of opinion that the preamble of the Bill is proved, subject to approval by the Local Government Board as regards borrowing powers.

Mr. VESEY KNOX said he had a number of clauses to bring up on behalf of the Coal Company which the promoters had not yet seen; and it was decided to take these next day.

Thursday, May 21.

Clauses were considered this morning.

Mr. LEES (Messrs. Lees and Co., Parliamentary Agents) said he now brought up the Bill amended to carry out the Committee's decision that the borrowing powers should be subject to the consent of the Local Government Board. As the Bill came before the Committee, it provided for the borrowing of £27,663 for lands, easements, and works; £12,337 for services, meters, stoves, and fittings; and £1000 for working capital. The clause had, however, been amended, so that no specific sums were mentioned, and that application would have to be made to the Local Government Board for any moneys to be borrowed. Another direction in which the Bill had been altered was in respect of clause 27, which gave the Council power to supply fittings. It had been suggested that this should be in the model form. He had therefore adopted this—of course, leaving out the section referring to giving the work to contractors, as it was not intended to do so in this case.

Mr. VESEY KNOX, on behalf of the Coal Company, said he had no objections to raise to what Mr. Lees had said; but he desired to bring up a number of other clauses. The first was an addition which he was going to suggest should be made to the model clause relating to the supply of fittings, having regard to the special circumstances of this case. The addition was in the following terms:

> The Council shall not provide or fix any such fittings, either in or to any premises which may for the time being be wired for electricity, without first obtaining the consent in writing of the owner of such premises.

As a matter of law, the state of things would be as follows: The present arrangement between the Coal Company and the Electric Light Company gave the owner, and not the tenant, the right to require the removal of the electric light fittings. Under the Bill, however, the occupier could make an agreement with the District Council by which the consent of the owner to enter the house need not be obtained.

Mr. LEES said the object of this amendment was to destroy the preamble of the Bill. The clause provided that the Council should not fix any fittings in any premises which for the time being were wired for electricity without the consent in writing of the owner of the house. If the Committee passed this, it might prevent, and was intended to prevent, miners from obtaining gas in their houses. If this clause were passed, the gas-works, to all intents and purposes, would be useless for supplying the district, or at any rate could not be used for supplying the large number of houses which were now wired for electricity unless the owner of the premises gave his consent. Of course, the Coal Company in this case could so arrange matters that the Council would not get the consent of the owner; and thus prevent the miners obtaining a supply of gas. Under section 11 of the Gas-Works Clauses Act of 1871, which was incorporated in the Bill, the Council were put under an obligation to supply any owner or occupier

with gas who desired it; but under the proposed clause the tenant would not be able to obtain a supply without the consent of the owner.

Mr. VESEY KNOX pointed out that any occupier who put in his own fittings would not have to obtain the consent of the owner. The Council, however, were proposing to deal with all the miners' houses as slot-meter users, and would therefore employ the ratepayers' money for piping and fittings.

Mr. LEES maintained that the clause would defeat the whole object of the Bill. He challenged Mr. Vesey Knox to produce a precedent in any gas, water, or electricity Bill where such a provision had been put in which would prevent an inhabitant getting a supply.

Mr. VESEY KNOX said he did not wish to prevent anybody getting a supply on the ordinary terms of the Gas-Works Clauses Act.

Mr. LEES said it was not to be supposed that the miners would put in their own fittings. It had never been done before in the district.

The CHAIRMAN, after clearing the room, said: The Committee are of opinion that the petitioners cannot have the insertion of this sub-clause.

Mr. VESEY KNOX then asked the Committee to insert in the Bill the "Northumberland Clause." It would no doubt be pointed out that this was the first time such a clause had been asked for in respect of a gas undertaking. This was quite true: but there was no reason why it should not, in similar circumstances, be applied against a gas undertaking.

Mr. *Henry Woodall*, who has advised the Coal Company, said he had carefully studied Mr. Valon's estimates, and was of the opinion that to supply gas in the district at less than 4s. 6d. to begin with would involve a loss. Therefore it was only fair that the protection the Coal Company asked for should be granted.

Mr. LEES protested against this evidence, and remarked upon the fact that Mr. Woodall had been in the room throughout the whole hearing of the case, but had never been called on the preamble.

The CHAIRMAN said he thought the evidence should be heard.

Mr. VESEY KNOX said he could tell the Committee why he did not call Mr. Woodall with regard to the preamble. In the House of Commons Mr. Woodall stated that he thought gas supplied at 4s. 6d. could be made to pay. Therefore he did not think Mr. Woodall would be likely to help his case as against the preamble of the Bill. The clause he was now putting before the Committee was that reasonable prices ought to be charged in order to prevent the undertaking falling upon the rates; and it was this view Mr. Woodall took.

Witness, continuing his evidence, said he did not anticipate any profit on the undertaking on the basis of Mr. Valon's figures until the end of fifteen years, because 3s. 6d. was a very low price for a district of this character. The "Northumberland Clause" was instigated by the gas industry, and was made applicable against municipal electrical undertakings; but he saw no reason why it should not be applied against a gas undertaking, in order to protect a ratepayer in the same way as the gas companies were protected as ratepayers when the clause was inserted in Electric Lighting Orders.

Mr. LEES cross-examined witness to the effect that the clause was unreasonable, inasmuch as it would prevent a reduction of price in order to assist, if necessary, in putting the undertaking in a sound condition. Witness agreed in the general proposition that a reduction of price was more likely to improve the prospects of an undertaking than an increase; but he did not think that this general proposition could be applied to this special case. He did not know of any instance of a losing undertaking which had been improved by an increase of price. As a matter of fact, he had never been associated with any company which had not been making a profit. He knew, however, of many instances where prices had been increased on account of the fluctuating price of coal. Counsel pointed out that the 4s. 2d. proposed by Mr. Valon to slot consumers was exactly the same as that now being charged at Houghton-le-Spring, where Mr. Woodall was Engineer. He then put further questions to the effect that this case was dissimilar to one in which there was competition between gas and electricity, because the Coal Company's gas undertaking was to be purchased. Therefore the Coal Company were asking for this protection merely as ratepayers. He asked witness if he could give a case of a ratepayer who had got this clause.

Mr. VESEY KNOX said that he was appearing also for the Newcastle-on-Tyne Electricity Company.

Mr. LEES said that the Coal Company had no *locus* to ask for the clause at all, and that Mr. Woodall appeared as the witness for the Coal Company. The fear was that the Newcastle Company would do their utmost, probably by selling current at a loss for a number of years, to strangle the Council's gas undertaking.

The CHAIRMAN: Then I understand you would not give any protection to the ratepayers?

Mr. LEES said he was giving protection of the ordinary character; but claimed the right to be allowed to carry on the business in the ordinary way.

The CHAIRMAN suggested that a compromise might be come to.

Mr. LEES said that it would not be possible to make any arrangement which could possibly safeguard the Council. If the Newcastle Company carried on a rate-war with the Northumberland Clause in the Bill, the Council would be forced to shut-down their gas-works, and the ratepayers would still have to pay off the outstanding loan on them.

The room was cleared. On the re-admission of the parties,

The CHAIRMAN said: The Committee do not allow the insertion of the clause.

Mr. VESEY KNOX said his last point was with regard to clause 14, where the arbitration for the purchase of the Coal Company's gas undertaking was to be carried out under the terms of the Arbitration Act of 1889. He asked the Committee to substitute the Lands Clauses Acts, which was the almost invariable practice in such cases.

Mr. LEES said that in this case the Council were not buying any land, but merely the mains, pipes, and apparatus of the Coal Company, who, in addition, were to receive compensation for any loss sustained by reason of their ceasing to supply gas. The point was that under the Lands Clauses Act there was an umpire, and an arbitrator to represent each side. He suggested that the costs of such an arbitration would be in the neighbourhood of £3000; whereas under the Arbitration Act there was only one arbitrator, and the costs were considerably reduced. The clause in the Bill was in exactly similar terms to that in the Ellesmere Port and Whitby Council Bill, which was passed by the House of Lords only three weeks ago.

Mr. VESEY KNOX said that, in order to meet Mr. Lees on the question of the expense, he was willing to say that the arbitration should be conducted by a single arbitrator under the Lands Clauses Act.

Mr. LEES would not agree to this.

The CHAIRMAN intimated that the Committee had decided to reject the amendment.

The remaining clauses were then formally gone through; and the Bill was ordered to be reported for third reading.

MISCELLANEOUS NEWS.

SOUTH AFRICAN LIGHTING ASSOCIATION, LIMITED.

Increase in Consumption at Grahamstown — Works Modernization and Renewal.

The Ordinary General Meeting of the Association was held on Wednesday last at the London Offices, No. 90, Cannon Street, E.C.—Sir DANIEL F. GODDARD, M.P., in the chair.

The SECRETARY (Mr. William Cash, F.C.A.) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the Directors considered that the report they had to make was a satisfactory one in many respects. He did not say that the Association had made all the advance that in some particulars they had hoped to have done during the year; but, on the whole, considering the history of the year, the results were quite satisfactory. The sale of gas had been increased by about 3 million cubic feet. This was not a large, but it was an appreciable, amount. But while the quantity of gas sold had been increased, they had not realized quite so much money for it. This required a little explanation. It was largely due to the very considerable reduction in the price of gas at Port Elizabeth—the price having been brought down from 8s. 9d. gross to 7s. 3½d. net per 1000 cubic feet. This was the price under which they had been working. The Directors had hoped that the reduction would, in a measure, have stayed the use of the electric light among the gas consumers; but he was sorry to say it had not had quite so good an effect as they had anticipated. Therefore, they had not received so much money for gas—in other words, the reduction had represented more in money than the increase in the quantity of gas sold. On the other hand, what they lost on account of the reduction in price in Port Elizabeth, they gained almost to a similar amount at Grahamstown. The decrease was £1157 in Port Elizabeth, and the increase in Grahamstown was £1079; so that the net decrease was quite small. At the last annual meeting, he spoke of the unaccounted-for gas; and he was glad to say in this respect they were on the road to improvement. A better figure in this regard could be shown this year than last by something like 2½ per cent. Their Manager claimed that it was rather more than that. But this was due to the corrections that he made for temperature and barometrical pressure. The Directors, however, thought it better to take and compare the figures as they had them from one year to another; and, so taking the figures, there was the marked reduction that he had mentioned. They hoped that month by month the unaccounted-for gas would continue to be slightly reduced. The number of meters was rather less this year. The Directors had not often to report this; but it was due to the fact that they had altered the price of gas as between lighting and heating, with the result that they were able to do away with second meters in the case of several of the consumers. Therefore they had a smaller number of meters than formerly, although the quantity of gas sold was rather more. The profits for the year were really very good. They were a little less than in the preceding year—by something like £500. But when it was remembered that they had been spending a large sum of money—between £1200 and £1300—on renewals at Port Elizabeth (the retort-house there had been thoroughly renewed), and had taken it out of revenue, and when it was remembered they had lost something like £1000 on account of the reduction, it would be seen that it was easy to account for the smaller amount of profit made. This expenditure on the renewal of plant would not recur, he hoped, for several years. The Directors had still further reduced the price of gas at Grahamstown as from Jan. 1. They could not yet say much about the results of this step; but there was a decidedly hopeful outlook for the undertaking there. It was a growing town, and was getting more and more important. Although there was a steady increase in the consumption of gas there, the Board were contemplating the question of the supply of electric light for some of the colleges and places which showed some disposition to require it. As they had a concession for the town, the Directors hoped it might be found worth while doing this in addition to the supply of gas. He ought perhaps to make a few observations about coal, because he alluded to the subject at the last meeting. The shareholders would probably recollect that he then mentioned that they had found a Colonial coal which was a fairly good gas coal, although not so good as English coal; but it cost so much less that it was better for the Company to use it at Port Elizabeth. Up to the present, however, they had not derived quite so much advantage from its use as was hoped, because they had bought a good deal of English coal. The price of the English coal, however, went up, and was still at a high price, which somewhat counterbalanced the advantage of the price of the Colonial coal. In Grahamstown, they had almost exclusively used the Colonial coal—partly because the coal was cheaper, and partly because the railway freight was so much less in the colony for Colonial than for English coal. So on both sides the Association got advantage from using the Colonial coal; the reduction in cost in Grahamstown amounting to a considerable sum. The Directors had been able to place another

£1000 to reserve; and they were recommending the same dividend as last year. They could well do this, as they had fairly earned the money. After paying the dividend recommended, there would be a balance of £2356 12s. 8d. to be carried forward.

Mr. HENRY WOODALL, in seconding the motion, said he regarded the Chairman's hopeful auguries with considerable satisfaction; and he coincided with what had been said as to the prospects. There were, as the Chairman had observed, some difficulties in the way; but he (Mr. Woodall) did not think that they were at all insurmountable. There were many circumstances which were of a hopeful character. The retort-house had been refitted with settings of the very best character. The charge for these had been partly met out of the revenue for the year; but the Company had not yet received the full advantage from the working of the new retorts, though he felt sure the result would be a considerable economy as compared with past doings. It would also be found, on looking through the accounts, that the expenditure on various items of upkeep was very considerable. This, he was confident, would be reduced in the future. If they looked at the item of meters, it would be seen that the outlay on their maintenance was fully 80 per cent. of the whole income from meters. The average of such expenditure in Great Britain was not more than 50 per cent.; so that, in the future, he hoped that this item would be considerably lessened. A great deal had been done in the renewal of services and the overhauling of mains. The effect was that the leakage account had been considerably lowered; and there was every prospect that the unaccounted-for gas would be still further reduced in the future. Therefore, taking one consideration with another, he thought they might rely upon the present rate of profit being fully maintained, if not improved upon, in the coming year.

Mr. ALEX. MITCHELL asked what was the total output of gas in Port Elizabeth?

The CHAIRMAN replied that the sale there was 47,554,500 cubic feet.

Mr. MITCHELL remarked that the second mortgage debentures now stood at £8000, against £10,000 the previous year. He supposed that £2000 had been paid off. Were the debentures being paid off at intervals?

The CHAIRMAN replied that they had paid off the £2000. Every bondholder had an opportunity of renewing; and in regard to those who did not wish to renew, as they had money on deposit, the Directors did not reissue the bonds.

Mr. MITCHELL said the shareholders had listened to a very interesting and clear statement of the condition of the Company's business during the past year and at the present time; and he thought the Board were to be congratulated upon the fact that, with considerable competition with the electric light (which competition could be found in other places besides South Africa), the Company were holding their own remarkably well. He thought 3 millions increase in gas consumption was a very material increase upon 47 millions. It was practically a little over 6 per cent.

The CHAIRMAN: The output I gave you referred to Port Elizabeth; the increase of 3 millions refers to both towns.

Mr. MITCHELL said there was, at any rate, a considerable increase, which was something for which to be thankful. He thought the policy of the Board in keeping down the capital, in maintaining the works distribution system in excellent condition, and in reducing the price of gas, was the best that any gas company could carry out. To keep the works in a high state of efficiency paid in the end. Although a sum of money for this purpose had been laid out during the past year, it would be returned to them through economies in a few years. He was quite sure, from the figures placed before them by the Chairman, the Board were on the right road, and that, through what they were doing, the Company would go on improving.

The CHAIRMAN said there were one or two observations he should like to make, as perhaps he had, in certain particulars, overstated the position. The whole of the cost of renewing the retorts would come out of revenue, but not all in one year, because clearly they did not get the advantage of the renewals last year, and would obtain it throughout this year. Therefore part of the cost was carried forward to the accounts of this year. In regard to capital, they had striven very hard to keep it down, knowing how important this was. But he should like to inform the shareholders that they would have to spend some capital next year. They must have a new gasholder at Grahamstown, and had accepted a contract for it. The cost would be about £2500. He did not want the shareholders to think they could go along altogether without some capital expenditure.

The motion was unanimously carried.

Moved by the CHAIRMAN, and seconded by Mr. JAMES MACALISTER, a dividend of 9 per cent. for the year (less the interim payment of 3½ per cent., and subject to income-tax at the rate of 1s. 2d. in the pound) was declared.

Mr. ANDREW L. DON proposed the re-election of the Chairman to his seat at the Board. He remarked that it was a great advantage to have Sir Daniel Goddard as their Chairman; and it was a satisfaction to them all to know that he was willing to continue to serve the Company in this capacity.

Mr. G. CRISPE WHITELEY, in seconding the motion, said it was a very real pleasure, and they were proud, to have Sir Daniel at the head of their undertaking. They lived in hope (this was the only thing some of them had now) that next year would be better than the last one. He hoped Sir Daniel would remain with them for a long time.

The motion was cordially agreed to.

The CHAIRMAN, in the course of his acknowledgments, said it would be a little strange if he were not interested in gas manufacture, seeing that he had been in the business almost from his birth. He was not sure he was not born on a gas-works—if he was not, he was born very near to one; and he had been intimately acquainted with this sort of concern for many years. This particular undertaking in South Africa had been of immense interest to him from its start; and he was pleased to continue, by the kind vote of the shareholders, at the head of the undertaking, which, on the whole, had been a very prosperous one indeed.

Mr. HENRY WOODALL (of Messrs. Corbet Woodall and Son, Consulting Engineers to the Association) proposed the reappointment as Auditor of Mr. P. D. Griffiths, F.C.A.

Mr. MITCHELL seconded the motion; and it was unanimously carried.

Proposed by Mr. F. R. SMITH, and seconded by Mr. HENRY BAILEY, a hearty vote of thanks was passed to the Chairman and Directors; and afterwards to the officers, their staffs, and the workmen, on the motion of Mr. MITCHELL, seconded by the CHAIRMAN—the latter remarking upon how much a Company of this kind, working at a distance, was dependent upon the zeal, energy, and good faith of their Manager and staff. They all deserved the acknowledgments of the shareholders.

A NEW "COALITE" REGISTRATION.

Capital £95,000.

According to last Friday's "Financial News," the Barnsley Smokeless Fuel Company has just been registered with a capital of £95,000 in £1 shares—50,000 participating preference and 45,000 ordinary. The objects are to carry on the business of producers and manufacturers of and dealers in fuel of all kinds, and to adopt an agreement with the British Coalite Company, Limited—the vendors. The minimum subscription upon which the Directors may proceed to allotment is seven preference shares. The first Directors (to number not less than two nor more than nine) are James Conchie and Stephen Wellington. The Old Silkstone Collieries, Limited, may, while holding 5000 shares, nominate one Director; and the British Coalite Company, Limited, may, while holding the like number, nominate two Directors. Remuneration, £100 each per annum (Chairman £150) and 5 per cent. of the net profits, divided between them.

"The Barnsley Smokeless Fuel Company, Limited, is to erect the first low temperature carbonization plant in the Yorkshire coalfields, on the property of the Old Silkstone Collieries, at Barnsley. Coalite shareholders will note with particular interest that the contracts are entered into with the Old Silkstone—one of the best-known collieries, and also one of the largest producers, and situated in the centre of the Yorkshire coalfield—and the Yorkshire Electric Power Company, whose area of supply covers about 1800 square miles of the West Riding of Yorkshire. It is understood that under the contract with this Company the gas to be supplied from this coalite plant at Barnsley will be at a figure which will altogether revolutionize the cost of fuel for generating electricity as against burning coal.

"The bye-products are stated to be contracted for with one of the most important firms of tar distillers in the country. The profits put forward in the prospectus now current are based on the working results obtained at Barking, and, it is hoped, will induce the important collieries in this country to go in for low-temperature carbonization of coal, as against the high-temperature coke-oven processes.

"The Coalite group, in the letter accompanying the prospectus to the shareholders, state that negotiations for the erection of coalite installations are going on with important institutions in London and elsewhere. People will begin to think that the revolutionary claims put forward by the British Coalite Company in their first prospectus are going to be realized at last."

Last Friday's "Financial Times" also referred to the scheme, and, after describing it, added: "The shareholders of the Coalite Company are to receive preferential consideration in respect of the preference issue; but after the severe disappointment experienced in connection with their own venture, it will not be a matter for wonder if they do not jump at the chance now given them of enlarging their interest in the enterprise. Moreover, it has yet to be definitely proved that the low-temperature process for the carbonization of coal is commercially more profitable than the high temperature process at present more generally in use. The very businesslike character of the new undertaking, however, is not without its attractions; and Coalite shareholders who can run the risk of further loss may consider themselves justified in incurring it. We do not feel compelled to discourage them; but we certainly think that anyone not in a position to face the possibility of loss should think twice before applying for shares."

The text of the letter above referred to, to the shareholders of the British Coalite Company, has since been received; and some extracts from it will interest. It says:

The Company has been formed for the purpose of erecting and working, in co-operation with the Old Silkstone Collieries, Limited, on their property at Barugh, Barnsley, a smokeless fuel plant, capable of treating 200 tons of coal a day under the patents and processes of the British Coalite Company, Limited, for which a licence will be granted.

The great demand that has sprung up in recent years for the valuable bye-products produced in modern coke-ovens—such as sulphate of ammonia, benzol, tar, and other derivatives from coal by dry distillation—has resulted in the erection of about 7200 units of modern coke-ovens on the various coalfields of the United Kingdom.

The result of this enormous increase in coking plants has been the over-production of hard metallurgical coke, for which there is only a limited demand for the purpose of smelting, &c., and which cannot be utilized for ordinary fuel purposes; so that a large number of bye-product plants now working are face to face with the problem of being unable to dispose of their coke at a remunerative price.

Under the British Coalite Company's patents, the essential part of which is the employment of a low-temperature (as distinguished from a high-temperature) process, an excellent commercial smokeless fuel is produced, for which there is a ready sale for household and steam purposes, combined with an increased yield of bye-products—the amount of tar produced being nearly double the quantity obtainable from modern coke-ovens, and realizing a much higher price.

As a result of carbonization tests carried out during 1913 at the British Coalite works at Barking on coal supplied from the above collieries, the Old Silkstone Collieries, Limited, has entered into an be agreement with British Coalite Company, Limited, which will be

transferred to this Company, under which this Company is to erect, on a plot of 3 acres contiguous to the Old Silkstone Coke-Oven and Chemical-Works at Barugh, a smokeless fuel plant of an initial capacity of 50 tons of coal per day, to be eventually enlarged to a capacity of 200 tons per day, and arrangements have been made under which the necessary bye-product plant for dealing with the residuals will be provided.

A contract has been entered into by British Coalite Company, Limited, with the Stettiner Chamotte Fabrik Actien Gesellschaft, whose representative was present throughout the tests at Barking, for the erection on favourable terms of the plant under plans prepared by the Stettiner Gesellschaft. The benefit of this contract, so far as relates to the plant, will also be transferred to the Company.

The Old Silkstone Collieries, Limited, has agreed to supply the works with the requisite quantity of washed slack of suitable quality for the production of smokeless fuel, for a period of 22 years at a fixed price, subject to revision at the end of the first seven years, and at the end of each subsequent period of five years.

Arrangements, remunerative to the Company, have been made with Henry Ellison, Limited, of Cleckheaton, for the disposal of the whole of the tar and benzol produced; and they have agreed to provide the necessary plant at their own cost as soon as the 200 ton coalite plant is completed.

The Yorkshire Electric Power Company, one of whose generating stations adjoins the proposed site of the new fuel plant, and which supplies with electric power one of the largest areas in Great Britain, has agreed to take the whole of the surplus gas from the plant.

It will be seen that the Company will commence operations under very favourable circumstances, which may be summed up as follows: 1. It will be assured of a constant supply of suitable slack at satisfactory prices. 2. It will have a ready market for its smokeless fuel, tar, and benzol. 3. Arrangements have already been made for the disposal of all surplus gas at profitable prices. 4. The plant will be situated in the centre of the most important coalfield of Great Britain, with direct railway communication with practically all the large industrial towns of the Midlands and the North.

A report on the operations of the British Coalite Company's plant at Barking, on Old Silkstone coals, has been prepared by Mr. Stephen Wellington, A.M.I.E.E., F.C.S., who estimates that the complete carbonizing plant to treat 200 tons of coal per day—including ammonia and gas-producer plants, but excluding the tar and benzol plants, which are to be provided by Henry Ellison, Limited—will cost, approximately, £35,000; and that on this installation, including profits from the tar and benzol, there should be a net profit of 6s. per ton, or £18,000 per annum on 200 tons per day of slack treated.

Among the orders for "Gunfire" controllers recently received by the Automatic Light Controlling Company, Limited, of Bournemouth, are installations for Exmouth, Old Whittington, Church, Hay (N.S.W.), Clitheroe, Macclesfield, and Birmingham.

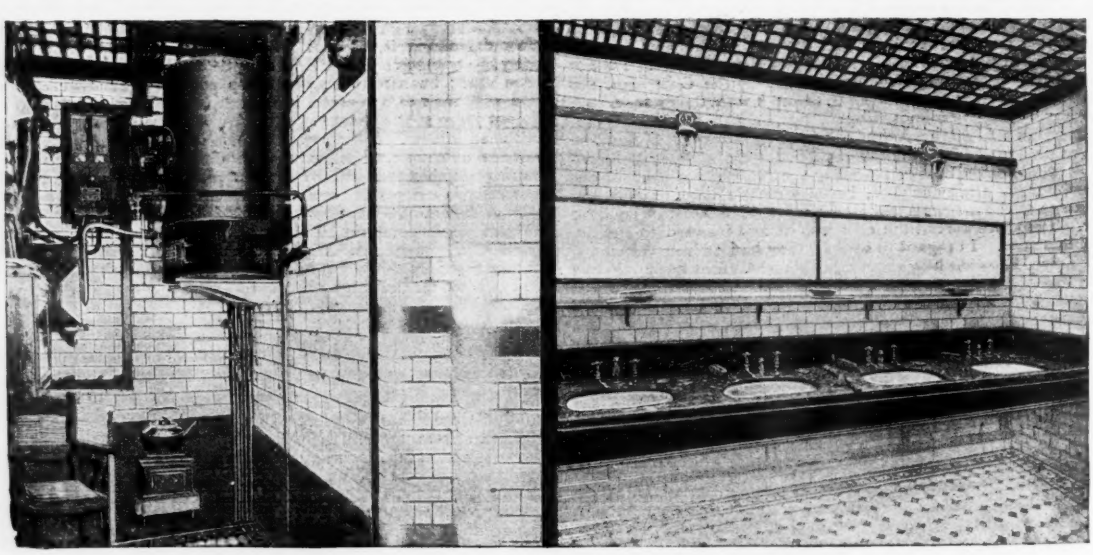
PETROL AIR GAS FOR WORKHOUSES.

A Debate at Newmarket.

Petrol air-gas has "caught the eye" of the Newmarket Board of Guardians; for the Workhouse Committee, having considered replies to questions from other Unions with reference to this gas, resolved to recommend that the Machine Gas Company should be asked to supply the Board with an estimate of the cost of installing the necessary plant at the workhouse.

Mr. WHEELER, in moving this resolution at a recent meeting of the Guardians, said they had had communications from seven Unions who had adopted the system; but generally the time had not been long enough to give an idea as to the probable saving. The Braintree and Romford Unions said that a considerable saving had been effected.

Mr. J. H. TROUGHTON (the Vice-Chairman) said that since the Committee met, he had gone into the subject at considerable length. It might, perhaps, be thought somewhat invidious, by the majority of the Guardians, for him to deal with the subject; but he assured them that he did so simply in the interests of the ratepayers. He represented a Company who paid a large amount of poor rate. Since the Committee passed this recommendation, circumstances had altered. They had no sooner passed the recommendation than they were asked if they would interview a representative of Cox's Air-Gas Company, who was outside. They did; and he gave them certain information which would probably form part and parcel of their estimate. The gas bills the last eight years had been as follows: 1906, £97; 1907, £96; 1908, £93; 1909, £96; 1910, £103; 1911, £99; 1912, £105; 1913, £107. This gave an average of £99 16s. per year. Only three of the replies received alleged a saving through machine gas. Romford returned a saving of £136 4s. 2d. There the coal gas bill was £421 14s. 7d. in 1913, and the cost of the machine gas installation was £443. Braintree had saved £65 on a gas bill of £170, and spent £300 in capital charges to effect the saving. The Romford gross saving worked out at 32 per cent.; but they deducted £13 4s. per cent. for depreciation of plant, leaving their net saving £76 4s. 2d., or £18 16s. per cent. on a gas bill 4 1-5th times larger than that of the Newmarket Union. All it was possible to save here, on that basis, was thus £18 16s. 10d. The Cox Air-Gas Company's representative said that two of their machines, costing £122 17s. each, would be necessary. A house for them would, at a low estimate, cost £100, and must be 30 feet away from existing buildings. A store for petrol, also away from buildings, would cost £25; and as the volume of air gas was twice that of coal gas, he estimated it would cost at least £50 to alter the pipes. Two meters would cost £48 1s. 6d. At present they had 400 burners, and would require at least 300 new air-gas burners, with globes, to replace them, costing not less than 4s. each—£60. This brought the capital cost of the installation up to £528 15s. 6d. Then there was upkeep. In round figures, £100 spent on coal gas at the Newmarket price of 3s. 6d. would



The "SUN" Automatic BOILER

installed in underground lavatories at St. Pancras, London: A typical case where the "SUN" is quite unapproached for EFFICIENCY and ECONOMY.

JOHN WRIGHT & CO., EUREKA WORKS, BIRMINGHAM.

give 314 million B.Th.U. A gallon of petrol would average about 150,000 B.Th.U.; so they would want 2095 gallons to give the same number of units. This would, at 1s. 6d. per gallon, cost £157 2s. 9d. With air gas they could only have incandescent mantles; and as the pressure was considerably greater than with coal gas, twice the quantity of mantles would be needed. They had at present 304 flat-flame burners, 80 incandescent (10 with bye-passes) and two large lamps—total 386 burners. They also had three boiling rings, one radiator, one heating iron, one cooking range, and two gas-fires. He had not allowed anything in his estimate for these two stoves, or for fixing the plant and connecting it up to the engine from which it was proposed to get steam for driving the air-gas machines. With flat-flame burners, they were not getting full advantage from their present gas consumption. Romford estimated steam at 2s. 6d. per week—£6 10s. per year—which was too low. They allowed nothing for attention or fuel; but the machines would have to go on all night. In the wards probably more gas was used after midnight than before. The installation would cost at least £500, which, at 4 per cent., meant £20 a year. Depreciation at 10 per cent. would be £50; renewals (four mantles per lamp per annum), £20; and renewals of glass, labour, &c, at least £20—making a total cost of £275 12s. 9d. a year, with capital charges of about £500. The Newmarket Board's gas bill was less than £100 on the average of the last eight years. He therefore thought it would be well for this recommendation to go no further. The Maldon Union recently considered the subject. They had figures from Romford before them as well as figures from the Electric Light Company; and they decided to let well alone. Ordinary gas was very much safer. If a petrol gas plant broke down, they would be without light at all. He had endeavoured to make a fair and reasonable estimate, and had not the least hesitation in saying that if they pursued this matter further they would be pursuing a will-o'-the-wisp. Some years ago he had fitted up a 53-light petrol plant in the neighbourhood; 47 of the lights going all night. The petrol used in the year ended March 25 last had cost £170 15s. net; while mantles and repairs to lamps cost £20. So that the cost for this 53-light installation was over £190 in the year.

Mr. STEPHENSON said they could only get 150,000 heat units out of a gallon of petrol. If they put petrol at 1s. 4d. per gallon, comparing it with the town gas they would have to pay 40 per cent. more for air gas. He had no doubt a saving had been effected in some places, by giving less light. Then, if they were burning town gas through flat-flame burners they were getting only one-fifth of the light they should get. In this place out of 386 burners only 82 were incandescent. The proper thing to do was to put in incandescent burners. With half the number of these they would save gas, and get very much more light than at present. He quoted from a paper read by Mr. Scott-Snell before the Illuminating Engineering Society extracts showing that petrol gas was one of the cheapest, safest, and most brilliant illuminants "where neither gas nor electricity can be obtained."

The matter was referred back to the Committee, with power to get an estimate if desired.

LANCASTER CORPORATION GAS-WORKS.

Mr. Cecil R. Armitage, in his first report as Manager of the Lancaster Corporation Gas-Works, states that the receipts for the past year totalled £33,671, and the expenditure £23,163, leaving a gross profit of £10,508. Out of this amount, £3021 has been paid for interest on stock and mortgages, £2142 has been added to the redemption fund, £820 paid for income-tax, £4000 contributed to the relief of the rates, and the balance carried to the reserve, which now aggregates £4485, in addition to the £10,000 at the bank as a working balance.

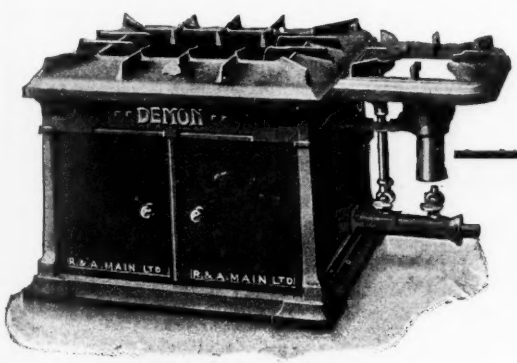
The total sales of gas realized £19,719, a decrease of £335, due to a reduction in price. Residuals account for £12,221. The average price received per 1000 cubic feet of gas sold was 1s. 10·4d. The cost of coal was £14,091, or an average of 13s. 0·55d. per ton, as against 11s. 8·53d. in the preceding year. Nothing was added to the capital account; but £1325, the cost of new mains, services, meters, and prepayment stoves, was charged direct to revenue account. The net cost of gas (9 68d. per 1000 cubic feet sold), the return for residuals (86·72 per cent. on the cost of coal), and the leakage (1·53 per cent.) compare favourably with other gas undertakings.

The efficiency of the works has been maintained, and received a tribute from Sir N. W. Helme, M.P., at the last Council meeting.

COVENTRY GAS-WORKS RESULTS.

Reduction in Price for Prepayment Consumers.

Though the past year's working of the Coventry Corporation gas undertaking resulted in a much lower net profit than the previous year's—£12,368, compared with £20,362—the report of the Gas Committee, as submitted to the City Council, was considered generally as satisfactory. The total borrowing powers since the acquisition of the undertaking amount, with nominal additions, to £479,789, of which £37,670 has been repaid out of the sinking fund, leaving the present liabilities £442,119. Against these liabilities, there are reserve and sinking funds, invested or awaiting investment, amounting to £95,372; thus leaving a balance of liability of £346,746. During the year the sum of £947 was expended upon capital account in respect of new mains. The total capital expenditure to March 31 was £484,439; but a sum of £58,000 has been set aside towards meeting the loss of capital consequent upon the abandonment of plant at the old works, thus reducing the actual total of capital expenditure to £426,439. As mentioned last week, the revenue for the year from all sources (including sale of gas, coke, tar, and other products) amounted to £171,245, compared with £166,456 in the previous year. The working expenses were £136,695, compared with £124,629. The increase in the latter is almost entirely accounted for by the higher cost of coal. Adding to



Main's "Demon" Griller.

MAIN'S SMALL SHOT:

ARE you fully provided with small shot for your Summer Campaign? — Grillers, Hotplates, Iron Heaters, Boiling Rings, &c. Main's have a splendid selection of small goods which are novel and useful. Exhibit them in your Showrooms and they will really help.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

the gross profit the sum of £362 brought forward, and £667 13s. 10d. for bank interest, the total is increased to £35,580. Capital and other charges amount to £22,942, so that the surplus available for the year is £12,638, against £20,362 in the previous year. The reserve fund amounts to £15,256, of which £7288 is invested in Consols, and £7968 is on deposit.

In presenting the accounts to the Council, Mr. Quinney drew attention to the fact that coals had cost £9751 more, and that of this amount £7900 was due to the increased price paid. The raising of the rate of wages accounted for another £900; and these two items explained the reduction in profits. In the previous year, the increase in the price of coal amounted to £5866; so that in two years coal had gone up £13,766, or about 3s. per ton. He reminded the Council, however, that there was a prospect of some reduction in coal prices this year, though against this there was almost a certainty of the value of residuals being lower. The importance of these residuals was revealed by the fact that of the £75,312 cost of coal and oil last year, the Committee realized £47,222 for the bye-products. The small increase in gas consumption during the year occasioned some regret; but it was pointed out that the winter had proved a mild one, and that this had a great effect upon the quantity of gas used. Satisfaction was expressed at the continued increase in the number of slot-meter customers. Gas unaccounted for was 4·39 per cent. of the make, compared with 3·56 per cent. During the year 5½ miles of mains had been laid, mostly in new streets, and 1770 new services added. There was an increase of 68 ordinary consumers, and 1235 slot consumers.

Some discussion upon the report followed. A proposition was made that the sum of £6000 should be voted out of the year's net profit in relief of local rates, instead of £5000, as recommended by the Committee. This, it was pointed out, would then equal the amount contributed by the Electricity Department. But this course was not agreed to; and the Committee's recommendation was adopted. It was also decided that £7000 should be set aside towards meeting the loss of capital consequent upon the abandonment of plant at the old works—making, with the amounts previously set aside, £65,000, towards meeting an estimated loss of £67,000. The balance of £638 was carried forward to the next account. The Council further agreed to a proposition to reduce the price of gas to consumers through prepayment meters from 2s. 10d. to 2s. 8d. per 1000 cubic feet.

Both gas and water supplies to a large area of the Sherwood residential district of Nottingham were cut off as a consequence of the heavy thunderstorm last Friday week. An old sewer burst and flooded excavations which had been made for the laying of a new sewer. The supporting soil was washed from under the water-mains and the gas-main; and they broke. The Gas Department and the Water Department sent men down as soon as possible; and, of course, no avoidable delay occurred in effecting the necessary repairs.

BLACKBURN GAS-WORKERS.

In the Quarterly Report of the National Union of the Gas-Workers and General Labourers, Mr. J. R. Clynes, M.P., who is Lancashire District Secretary, dealing with the Lancashire districts, states that while the income was £800 more than last year, dispute benefits were unusually high; the amount being £6700. The largest sum paid was for the Blackburn Corporation workers; about £2300 being expended in their support. "The settlement," he remarks, "was on a basis which revised wages, and placed men on a secure weekly minimum in place of uncertain earnings arising from lost time. In some other cases substantial advantages were secured. We regret to say that, after the terms of settlement were approved and signed, we found that numbers of men were kept unemployed for weeks, despite the fact that all should have restarted, except two men whose work had terminated and some gas-workers who, for seasonal causes, were not required. Our view of the integrity of some Corporation leaders has been somewhat strained by treatment of men who appear to have been left outside the bargain of settlement for financial or other departmental reasons which were no part of the settlement arrived at."

Speaking at the quarterly meeting of the Blackburn and District Trades and Labour Council, Mr. E. Porter, the local Secretary of the Gas-Workers' Union, referring to the reinstatement of men concerned in the strike, said they, as a Labour Council, had not received much satisfaction in this matter. It was true that only a small number of men were still out; but if only one were out there was still the point that the Corporation were not carrying out their side of the burgain. The dispute had cost the men's Union nearly £2300 in actual strike pay; and so far as the Trades Council were concerned, he thought they could take it for granted that one way and another the cost was over £15,000. He did not hope for much from the Town Council so far as the reinstatement question was concerned.

COATING OF LEEDS WATER-MAINS.

In a recent issue of the "Yorkshire Post," the following remarks were published on the question of the coating of Leeds water-mains: "There is a strong hope that the Water Committee of the Leeds Corporation will escape the heavy expense which it seemed at one time probable they would be involved in before clearing the Washburn water-mains from the Swinsty reservoir. When these mains were first laid down, about 10 million gallons of water ran through them every day; but this quantity was reduced by the hard and soft incrustations which formed inside the pipe to less than 6 millions a day. As most of the incrustation was composed of soft peaty matter, the Water Engineer (Mr. C. G. Henzell) was instructed to find some method of getting this matter out of the mains. Two of them were accordingly cleaned out by hand—

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The Iron Foundation is adapted to the "open" and the "closed" geyser, making each a strong and lasting combination. The principle of Vertical construction of water-ways in these Richmond Patent Geysers has been adopted after extensive laboratory tests, and will be found in all our water heaters, including the "IRONCLAD" All Iron Circulator.

Interiors always accessible for Inspection.

THE RICHMOND GAS STOVE AND METER COMPANY LIMITED

Hot Water Engineers,

WARRINGTON AND LONDON.

an extraordinarily costly proceeding, which meant breaking into the pipe at all points. On further consideration, it was decided to attempt the method of cleaning out the mains with a specially designed brush about 4 ft. 6 in. long, and having the bristles arranged spirally. No. 3 main was opened in two places 1¾ miles apart. The brush was inserted, and forced from end to end by the pressure of the water, with the result that the soft deposit was removed in large quantities and ejected from the pipe at different outlets. The capacity of the pipe, even in the comparatively small stretch dealt with, was raised from 5,600,000 gallons a day to 6,600,000 gallons. 'Though one cannot be certain,' said the Engineer to one of our representatives, 'it looks as if the experiment will be successful; and in that case it will not be necessary to go to the great expense of laying another main.' It is proposed shortly to brush out in the same way another length of main extending for about five miles."

This statement drew from Mr. Ernest Reuss a letter to our contemporary, in which he pointed out that while no doubt the brushes would remove a considerable portion of the obstructive coating, if the water were treated at the intake by electrolysis it would in time remove any remaining obstruction, and prevent deposit in future. Furthermore, water so treated would be absolutely sterile. He added that his reason for offering this suggestion was that he had had practical experience of two electrolytical water sterilizing installations, which were both successful. The cost of brushing the five miles of mains the Engineer proposed shortly to commence would go a long way towards meeting the outlay on an electrolytic installation capable of treating the whole 10 million gallons daily; and the question of laying a duplicate main would then disappear.

Gas and Electricity at Batley.

The Batley electricity undertaking does not appear to be meeting the requirements of the public—and tradesmen in particular—as it was hoped it would do; and now, as a result of the comparison of expensive arc lamps with less costly lamps burning high-pressure gas, the lamps of 1000-candle power costing ½d. per hour for gas have proved themselves the most effective as street illuminants. Notwithstanding this, however, there appears to be a desire on the part of some members of the Electricity Committee to continue the use of electricity, as they have gone to the expense of laying cables and erecting standards for the purpose of street lighting. It is pointed out that high-pressure gas is the light for cheapness and brilliancy for shopkeepers; and these people ought not to be denied the opportunity of making their choice. The shopkeepers declare that it is an injustice to them to have to pay 3½d. per unit for current for lighting purposes, whereas power users only pay ¾d.—half cost price. It is held that the Batley Corporation cannot hope to stop the progress of high-pressure gas for outside lighting purposes, and to do so would be both dangerous and foolish.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

It is not often that a gas manager can claim fifty years' continuous service with either company or corporation; but this is the proud position held by Mr. George R. Hislop, who has been for fifty years Manager of the gas-works at Paisley. The date of his appointment was May 30, 1865. Every member of the gas profession will wish him continued good health and a long life of usefulness. The many patents which Mr. Hislop has taken out have helped forward the gas industry; and his well-known reports on Scottish coals are referred to by every coalmaster and gas coal buyer when selling or purchasing the annual supplies required in gas-works. Mr. Hislop's popularity is evident at the various meetings which he attends. His long experience and intimate knowledge of the various branches of gas making and supply are always at the disposal of any of his more youthful brethren who may apply to him.

Mr. Turriff, the Burgh Surveyor of Elgin, referred, in his annual report to the Town Council, to certain complaints as to the public lighting. Of the 306 street-lamps, 192 are fitted with incandescent burners. The principal complaints were service faults. He knew of no other system under which the lighting department could be run so cheaply as at present. He suggests a separate lighting staff instead of the present one. The "off" season, he considers, should be during the months of June and July only, and the whole-night lamps would be lighted throughout the entire season according to the minutes of the Council. He estimates the cost of these improvements as follows: Gas £80, wages £33—a total increase of £123. Mr. J. M. Fraser, the Convener of the Lighting Committee, sympathized whole-heartedly with the suggestions made by Mr. Turriff. It was agreed to defer the report for a month, to give the Council time to consider it fully.

The Edinburgh and Leith Corporations' Gas Commissioners have agreed to charge for public lighting, both in Edinburgh and in Leith, 2s. 3d. net per 1000 cubic feet for incandescent burners, and 2s. 7d. per 1000 cubic feet for flat-flame burners. For common stair lighting the charge will be 10s. 7d., 15s. 11d., and 18s. 7d. for flat-flame jets of 1, 1½, and 1¾ cubic feet per hour respectively, and for incandescent stair lighting in Leith at 17s. 6d. per jet per annum, which includes supplying and fitting up of incandescent burners, mantles, globes, service pipes, &c., as well as cleaning and extinguishing. The Engineer was also instructed to consider and report as to the increasing demand for high-pressure gas.

Among the list of works at which extensions are to be made is to be found that of the Holytown Gas Company. Both renewals and increases of plant are to be carried out owing to the abnormal demand for gas in the district. It is stated that the Holytown Gas Company were, if not absolutely the pioneers of free gas cookers, second only to Glasgow Corporation in this respect in Scotland. This question is one

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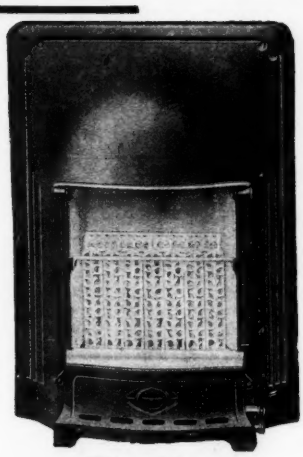
(See "THE LANCET," 17th Nov., 1906.)



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which has been very freely discussed at gas managers' meetings and very different opinions expressed. The fact is that so much depends on the comparative price of gas and coal in the particular district represented by the speaker. Generally, however, it will be found that the principle of free cookers is successful when the price of gas is under 3s. But then coal must not be on sale at too cheap a price, or the return on the money invested in the stove will be small. A point in connection with this question of money invested in cookers given free or lent on hire is how much should be written off annually. If the life of a stove is averaged at ten years and 10 per cent. written off each year, should this be upon the original value, or upon the written down value each year? If the value of stoves purchased eleven years ago is invariably written off, then the 10 per cent. can be calculated upon the original value of those stoves purchased within the last ten years, as after that period the others have been fully paid for by the percentage written off. Many undertakings, however, write off far more than this 10 per cent. Consequently the stoves stand at something like the value of the last year's purchases only, which is unfair to the present consumer, but a good thing for the future customer. Meters also are frequently treated in the same way; and while this may be good business in the carrying on of a gas company's affairs, it is not so satisfactory when found in the accounts of a corporation.

Stockport Corporation Strike Figures.—At a special meeting of the Stockport Town Council last week, an increased rate of 6d. in the pound was passed without hostile criticism. Alderman Bell, the Chairman of the Finance Committee, said there was a decrease of £10,000 in the profits of the gas undertaking; the amount being £12,000. The cost of the strike at the gas-works was between £3500 and £4000.

Oswaldtwistle Corporation Gas Undertaking.—At the last meeting of the Oswaldtwistle Urban District Council, it was reported that the profit on the gas undertaking during the past year was £2307, against £3204 in the previous year. The total expenditure had increased by £1986, due mainly to the greater cost of coal and increased pay to workmen. The income had gone up £976, chiefly through the more general adoption of gas for cooking. Mr. T. C. Usher, who made the statement, said that the gas undertaking stood in a good position, owing to the foresight of their Manager (Mr. J. H. Davies).

New Reservoirs for Bolton.—The question of constructing new reservoirs has been under the consideration of the Bolton Corporation Water Committee for some time; but last Tuesday it was officially announced that the Committee had decided upon the construction of two reservoirs in the Eagley and Hordern districts between Bolton and Darwen. The Water Engineer has been instructed to prepare plans and specifications for the works, which it is expected will be completed in 1923. The approximate holding capacity of the Eagley reservoir is put at 450 million gallons, and of Hordern at 170 million gallons. The reservoir at Delph, Edgworth, in course of construction, is expected to be ready in two years. Its capacity will be 550 million gallons.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *May* 30.

There is no alteration to report in the London markets for tar and ammonia products. The supply of tar and pitch for road purposes continues to absorb the attention of manufacturers.

Tar and Tar Products in the Provinces.

May 30.

The average values during the week were: Tar, 25s. to 29s. Pitch, east coast, 34s. to 34s. 6d.; west coast, Manchester, 33s. 3d. to 33s. 9d.; Liverpool, 34s. 6d. to 35s. 6d.; Clyde, 34s. 6d. to 34s. 9d. Benzol, 90 per cent., naked, North, 10d. to 10½d.; 50-90 per cent., naked, North, 10d. to 10½d. Toluol, naked, North, 10½d. to 11d. Crude naphtha, in bulk, North, 4⅜d. to 5d. Solvent naphtha, naked, North, 9¼d. to 9½d. f.o.b. Heavy naphtha, naked, North, 9d. to 9¼d. f.o.b. Creosote, in bulk, North, 3¼d. to 3⅜d. Heavy oils, in bulk, 3⅞d. to 4⅛d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 1d. to 1s. 1½d. Naphthalene, £4 10s. to £10; salts, 55s. to 60s., bags included. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, nominally, ¾d. per unit, packages included and delivered.

Sulphate of Ammonia Prices in the Provinces.

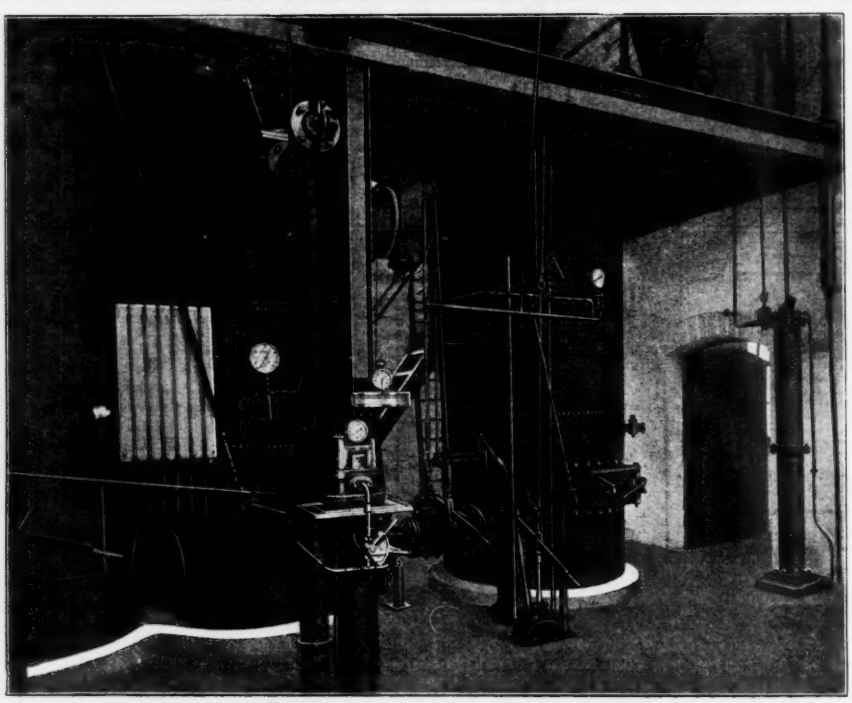
LIVERPOOL, *May* 30.

During the past week the lack of strength in the position has become more pronounced, and values have again receded at a quicker pace. There has continued to be a paucity of fresh orders in the market, and manufacturers have been more anxious to dispose of their current production. The closing quotations are £10 13s. 9d. per ton f.o.b. Hull, £10 15s. per ton f.o.b. Liverpool, and £10 17s. 6d. per ton f.o.b. Leith. In the forward position buyers have been rather apathetic, and few transactions have been reported, but it has transpired that first-hand sales have been made over the next few months at a little below £11 per ton f.o.b. at the ports.

Nitrate of Soda.

There is no change in either the tone or the value of this article, and quotations are repeated at 9s. 10½d. per cwt. for ordinary, and 10s. 1½d. for refined quality, on spot.

From another source it is reported that a further drop in sulphate of ammonia has been seen during the past week, and from all accounts it appears to be going lower. Outside London, makes are quoted at £10 2s. 6d.; Hull, £10 17s. 6d. to £11; Liverpool, £11; Leith, £11 2s. 6d.; Middlesbrough, £11.



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COAL TRADE REPORT.

Northern Coal Trade.

The coal trade has been active; and the shipments have been heavy up to the holidays. In steam coals, the demand is good, and prices are steady on the whole. Best Northumbrians are 14s. 6d. to 14s. 10d. per ton f.o.b., according to the time of delivery; second-class steams are about 12s. 6d. per ton; and steam smalls are 7s. 6d. to 8s. 6d. for the varying qualities. The output has been very good up to the time of the holiday, and has been well taken up. In the gas coal trade, the demand is a little interfered with by the higher freights to Mediterranean ports, which have momentarily checked exports. Best Durham gas coals are 13s. 6d. per ton f.o.b.; second-class kinds are about 12s. 6d. per ton; and "Wear specials" round about 14s. per ton f.o.b. In contracts, those of the Newcastle and Gateshead Gas Company and of the South Shields Company are in close negotiation; and it is reported—though not officially—that several lots have been bought at prices about 11s. 9d. per ton, which may be taken to be 1s. 6d. per ton below the price that ruled for the contracts entered into a year ago. It is probable that the contracts will be fully settled in a few days; and it is certain that the prices will show an appreciable reduction from the high figures of last year. It may be remembered that the Chairman of the Newcastle Gas Company last February expressed the opinion that the "cost of coals and oil showed signs of moderating before" the contracts now in treaty. Gas coke is firm at 13s. to 13s. 6d. per ton f.o.b.

Proposed Purchase of the Chester Water-Works.

At a meeting of the Chester Town Council last Wednesday, a letter was read from the Chester Water Company stating that, in order to give effect to the Chester Water-Works Act, 1911, particularly the sections inserted at the instance of the Corporation and the Duke of Westminster, a capital expenditure of £150,000 would be involved. The Duke of Westminster had been approached with reference to modifications in the protection clauses; but intimation had been received that no concessions could be made, and further advice would have to be secured as to the best way of dealing with the matter. The Public Health Committee had resolved that it was desirable, on the grounds of the public health of the city, that the Corporation should take steps to acquire the water undertaking, and that it be referred to the Finance Committee to consider the financial points involved. This recommendation of the Committee was adopted by the Council.

The Lancaster Corporation Water Department shows an income for the past year of £17,375, and an expenditure of £12,457. The net profit is £4918, or £524 less than the previous year, and £138 less than estimated for. The reserve fund stands at £3159.

Glover-West Verticals for St. Helens.

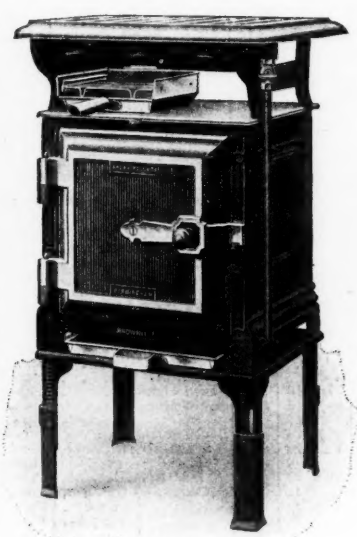
Major C. E. Norton held an inquiry at St. Helens last Thursday, by order of the Local Government Board, into the application by the Corporation for power to borrow £42,191 for the gas undertaking. Mr. W. H. Andrew (the Town Clerk) said the proposal of the Gas Committee was to put up 64 Glover-West vertical retorts, which would bring up the capacity of the works to 3½ million cubic feet a day. The new system would enable the Corporation to increase the make of gas per ton of coal, and would further the economical working of the undertaking. The demand for gas was increasing—it having been 392 million cubic feet in 1904, and 555 millions last year. Mr. Samuel Glover (the Gas Engineer) submitted the plans and explained the mechanical details.

Stoke-on-Trent Gas-Works Management.

The Gas Committee made various recommendations to the Stoke-on-Trent Federated Council last Thursday, with reference to the changes in the management of the four gas undertakings rendered necessary by the death of Mr. Edward Jones, the Manager of the Burslem works. They recommended that Mr. William Langford, the Engineer of the Longton Works, be appointed Chief Engineer and Manager of the Corporation gas-works, at an annual salary of £750, and that Mr. R. Surtees be appointed Chief Assistant Engineer and Resident Engineer of the Burslem works, at his present salary of £350. They further recommended that Mr. W. Prince, the Manager of the Stoke works, be given three months' notice to terminate his appointment, and that he be awarded an annual sum equal to twenty-one-sixtieths of his salary of £500 for loss of office. After a discussion, in which objection was taken to the payment of compensation to Mr. Prince, the Committee's recommendation in his case was approved. The other recommendations were referred back to the Committee for fuller information as to the scheme of reconstruction. A further recommendation by the Committee for a deputation to be appointed to visit various gas-works with regard to a proposed extension of carbonizing plant was disapproved; and an amendment by Alderman Geen was carried, that a report be prepared and submitted to the Council as to the possibility of linking-up the gas undertakings in the borough before spending further money in the way extensions at any one of the works.

Rates and Gas Charges at Blackpool.—The question as to whether they should take 2d. per 1000 cubic feet off the price of gas or reduce the rates by 2d. in the pound has been discussed by the Blackpool Town Council, sitting as the Finance and General Purposes Committee. It was decided by a narrow majority that the price of gas should be reduced; but the matter will, of course, have to come before the open Council.

ARDEN HILL'S "BROWNIE" GAS COOKER.



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Bury Gas Charges.—The charge for gas in Bury will for the next twelve months remain at 2s. 3d. per 1000 cubic feet; but the deduction for the gas consumers' share of profits will be reduced from 3d. to 2d. per 1000 feet. Thus the net price will be 1d. more per 1000.

Bingley Gas-Works.—At a meeting of the Bingley Urban District Council last week, the annual statement in connection with the gas-works was presented. This showed that the gas sold had increased during the past year from 133 million cubic feet to 146 millions; but notwithstanding this increase, there was a net loss on the year's working of £193, attributable to the higher cost of coal and other expenses, and the reduction in price of 2d. per 1000 cubic feet. The increased cost of coal was over £1000, or 1s. 7d. per ton.

Ellesmere Port Extensions.—At the last meeting of the Ellesmere Port Gas Committee, the Engineer (Mr. W. Newbigging) submitted plans showing his proposals for the laying-out of the new works and the type of plant he recommended. The works, when completed, will be capable of manufacturing double the quantity of gas at present required, and have been so designed as to permit of economical extension as occasion demands. The Engineer suggested that provisional tenders should be advertised for; and he strongly advocated the division of the work into eight sections—separate tenders to be obtained and special contracts to be entered into in respect thereof, excepting in the case where a contractor is successful for more than one of the items. The plans and scheme were approved, and the contracts ordered to be let, subject to the Royal Assent being received to the Council's Bill.

Bideford Gas Company.—The annual report presented at the meeting of the Bideford Gas Company last week stated that the sales of gas and residual products had shown a satisfactory increase; but the enhanced cost of coal and the higher charges for freight had very much lessened the profit on the year's working. Satisfactory results had been experienced from the opening of the new show-rooms and offices. Before next winter, a new setting of retorts would be required; and a contract for the work had been accepted. The meeting (over which Mr. F. A. Searle presided) adopted the report and accounts, and sanctioned the payment of dividends of 13½ per cent. on the original shares and 10½ per cent. on the additional shares.

Gas-Workers' Organization in the Midlands.—Substantial progress in regard to organization and receipts was reported at a meeting of the Midland District Council of the National Union of Gas-Workers and General Labourers held at Nottingham last Saturday week. It appeared that within the area covered the income for the year had been £76,065, exclusive of a balance of £12,851 brought forward from 1912. The expenditure had been £58,618, leaving a balance in hand at the end of 1913 of £30,298. A sum of £16,835 had been disbursed in strike, lock-out, and "victimization" benefits, £5829 in unemployment benefit, and £1480 for disablement. The membership at the end of December, 1911, was 3382; the branches numbering 20. At the close of December last, the membership had risen to 5419, and there were now 30 branches—showing an increase of 2037 members and 10 branches. The district received from the central fund in dispute pay, "victimization" grants, and special distress grants, a sum of £1398 3s.

GAS COMPANIES IN THE STOCK EXCHANGE.

It is a pleasing task to be able to record a considerable improvement in the position of things on the Stock Exchange after the cruel depression which has so long been weighing them down. To this happy condition of affairs a variety of circumstances contributed. The rising of Parliament brought relief from the intense strain caused by the continuous and unrelaxed presentment of the Ulster peril; foreign relations appeared less threatening; apprehension as to Money Market movements was calmed; and, finally, the settlement of the fortnightly account brought no realization of misgivings entertained. In fact, but for the difficulty in the building trade and the outlook in other labour centres, it would have been a thoroughly bright week. As it was, however, prices in many lines had a fair advance, and Consols effected an improvement of ⅝. The opening day was quite promising, cheered by the Ipswich election, traffic returns, and some bear closing. Government issues were firm, and Consols gained ⅜. Rails were stronger; and American closed at higher figures. The Foreign Market took the Albanian situation calmly. Tuesday was inactive, and markets were uneven. Government issues were not so strong, and Consols fell back ¼. Rails were unstable; trouble on the North Eastern being descried ahead. But Transatlantics did fairly well. Wednesday was Derby Day, and markets were at low pressure. But in other respects there was a marked improvement; markets being strong and cheerful. Consols advanced ¼. Rails rose moderately, Transatlantics were well supported, and Foreign were firm. On Thursday, the bright tone was strengthened; all factors being favourable. It was quite a bull's day on the whole; and prices advanced all along the line. Consols were ⅛ higher, Rails were fortified by a fair amount of buying for investment, and the rest generally shared. Friday was less bright, and markets were uneven—some stronger, and others the reverse. Government issues were quite firm, and Consols gained another ⅛, closing at 74⅞ to 75⅛. Rails were rather put out by labour matters, and Transatlantics were weaker; but Foreign held firm. The Exchange was closed on Saturday. In the Money Market, there was a strong demand, and the supply was not abundant. Discount rates were a little easier. Business in the Gas Market was of the quietest—possibly a record week in this respect. The market was too inanimate to show any characteristic beyond its usual steadiness. Prices were quite unchanged, with the exception of a couple of *ex div.* variations, and a rise of 1 in Melbourne bonds. In Gas Light and Coke issues, the ordinary had a dozen transactions at 101⅛ to 102½. In the secured issues, the preference marked 97 to 98½, and the debenture 74½. In South Metropolitan, there were some half-a-dozen dealings at 109½ to 110½, and the debenture realized 73½ to 74½. Nothing was done in Commercials. Among the Suburban and Provincial group, British was done at 44½, South Suburban at 115 and 115½, and ditto preference at 111½. In the Continental companies, Imperial changed hands at 162 to 163½, and the debenture at 84¾. Among the undertakings of the remoter world, Primitiva fetched 6 and 6¼, ditto preference 5 3/32 to 5 5/16, and Melbourne bonds 100—a rise of 1.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE WEEK.

Bank Rate (fixed January 29), 3 per cent. Last year, 4½ per cent. Consols, 74⅞—75⅛. Previous week, 74⅛—74⅜.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	61—66	..	3 15 9	75,000	5	Dec. 11	6	Malta & Mediterranean	4⅜—4½	..	6 3 1
374,000	,,	Jan. 15	4	Do. 4 p.c. Deb.	73—81	..	4 12 9	250,000	100	April 1	4½	Met. of Melbourne 4½ p.c. Deb.	89—101	+1	4 9 1
280,000	5	April 29	7½	Bombay, Ltd.	5⅛—6⅜	..	5 17 8								
50,000	10	Feb. 26	16	Bourne- 10 p.c.	29—30	..	5 6 8	541,920	20	May 23	4	Monte Video, Ltd.	11⅜—12½*	..	6 13 1
852,500	10	,,	7	mouth Gas B 7 p.c.	14½—15	..	4 18 4	1,775,892	Stk.	Feb. 26	4½	Newc'tle&G'tesh'd Con.	99½—100	..	4 10 0
75,000	10	,,	8	and Water Pref. 6 p.c.	13½—14	..	4 5 9	529,705	Stk.	Dec. 30	8½	Do. 3½ p.c. Deb.	83½—84½	..	4 2 10
380,000	Stk.	Feb. 26	14	Brentford Consolidated	260—265	..	5 5 8	55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	13½—14½	..	5 6 2
330,000	,,	,,	11	Do. New	204—209	..	5 5 8	300,000	Stk.	May 14	8	Oriental, Ltd.	117—122	..	6 11 2
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	..	4 10 1	60,000	5	Mar. 26	10	Ottoman, Ltd.	7⅛—7⅝	..	6 9 0
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	93—95	..	4 4 3	60,000	50	Feb. 25	13	Portsea, Island B	123—131	..	4 19 3
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	207—212	..	5 3 9	100,000	50	,,	12	Do. C	118—121	..	4 19 2
244,200	,,	,,	8	Do. A Ord. Stk.	153—158	..	5 1 3	249,980	5	April 29	8	Primitiva Ord.	6—6¼	..	6 3 1
530,000	20	Mar. 26	12½	British	44—45	..	5 11 1	499,960	5	Dec. 30	5	,, 5 p.c. Pref.	5—5¼	..	4 15 8
120,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. Stk.	90—92	..	4 7 0	521,600	100	Dec. 1	4	,, 4 p.c. Deb.	93—95	..	4 4 3
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	89—91	..	4 7 11	346,193	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	87—89	..	4 9 11
100,000	10	—	—	Cape Town & Dis., Ltd.	1½—2½	..	—	150,000	10	May 14	6	San Paulo 6 p.c. Pref.	10½—11½	..	5 6 8
100,000	10	—	—	Do. 4½ p.c. Pref.	5—7	..	—	125,000	50	Jan. 2	5	5 p.c. Deb.	48—50	..	5 0 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	73—78	..	5 15 5	135,000	Stk.	Mar. 12	10	Sheffield A	223—224	..	4 9 3
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	103—110	..	4 10 11	209,984	,,	,,	10	Do. B	232—234	..	4 9 3
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	..	5 1 2	523,500	,,	,,	10	Do. C	222—224	..	4 9 3
560,000	,,	,,	5½	Do. 3½ p.c. do.	103½—105½	..	5 1 1	90,000	10	May 28	7½	South African	10½—11½*	..	6 10 5
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	71—73	..	4 2 2	6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	109—111	..	4 18 6
800,000	Stk.	,,	4†	Continental Union, Ltd.	80—83	..	4 16 5	1,895,445	,,	Jan. 15	3	Do. 3 p.c. Deb.	73—75	..	4 0 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	117—122	..	5 14 9	209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	..	5 6 11
492,270	Stk.	—	6	Derby Con. Stk.	123—125	..	4 16 0	952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	..	5 3 5
55,000	,,	—	4	Do. Deb. Stk.	102—104	..	3 16 11	60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	..	4 9 3
1,022,180	10	Jan. 15	10	European, Ltd.	18—18½	..	5 8 1	117,058	,,	Dec. 30	5	Do. 5 p.c. Deb. Stk.	113—115	..	4 6 11
13,345,650	Stk.	Feb. 12	1/17/4	Gas 4 p.c. Ord.	101—103	..	4 14 7	629,740	Stk.	May 14	5	Southampton Ord.	99—102	..	4 18 0
2,600,000	,,	,,	8½	Light 8½ p.c. max.	76—79	..	4 8 7	120,000	Stk.	Feb. 12	7⅜	Tottenham A 5 p.c.	135—138	..	5 6 10
4,052,235	,,	,,	4	and 4 p.c. Con. Pref.	96—99	..	4 0 10	543,940	,,	,,	5½	Tottenham B 5½ p.c.	115—117	..	5 0 5
4 671,850	,,	Dec. 11	3	Coke 3 p.c. Con. Deb.	73½—75½	..	3 19 6	149,470	,,	Dec. 30	4	District 4 p.c. Deb.	89—91	..	4 7 11
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	..	5 12 4	182,380	10	,,	5	Tuscan, Ltd.	5—6	..	8 6 8
70,000	10	April 29	11	Hongkong & China, Ltd.	16½—16⅝	..	6 11 4	149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	95—97	..	5 3 1
131,030	Stk.	Mar. 12	7⅜	Ilford A and C	151—154	..	4 19 0	236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—109½	..	4 11 4
65,780	,,	,,	6⅜	Do. B	115—118	..	5 3 10					Wandsworth, Wimbledon, and Epsom—			
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	94—96	..	4 3 4	30,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151—156	..	5 7 4
4,940,000	Stk.	May 14	9	Imperial Continental	162—167	..	5 7 9	255,636	,,	,,	6⅜	,, B 3½ p.c.	129—134	..	5 2 7
1,235,000	Stk.	Feb. 12	8½	Do. 3½ p.c. Deb. Red.	84—86	..	4 1 5	108,075	,,	,,	5/17/8	,, C 3½ p.c.	110—115	..	5 2 0
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	..	5 7 5	352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	..	5 0 5
561,000	Stk.	Feb. 26	10	Liverpool United A	211—213	..	4 13 11	98,000	,,	,,	6⅜	Epsom 5 p.c.	121—126	..	5 5 2
718,100	,,	,,	7	Do. B	143—145	..	4 16 7	88,416	,,	Dec. 30	3	3 p.c. Deb. Stk.	68—71	..	4 4 6
306,083	,,	Dec. 30	4	Do. Deb. Stk.	99—101	..	3 19 3								
63,480	Stk.	Dec. 30	3	Maidstone 3 p.c. Deb.	65—67	..	4 9 7								

Prices marked * are "Ex Div." † Next Dividend will be at this rate.

Sales of Stocks and Shares.

Several new issues of gas and water stocks and shares were offered by Messrs. A. & W. Richards, at an auction sale at the Mart, Tokenhouse Yard, E.C., last Tuesday. In the Aldershot Gas, Water, and District Lighting Company a new issue of £7000 of "C" consolidated stock was sold at from £92 5s. to £90 10s. per £100. This stock ranks for a maximum dividend of 5 per cent. equally with existing similar stock now receiving this rate. There was also disposed of £1500 of 4 per cent. consolidated preference stock in the same Company at from £83 to £82 10s. per £100. By order of the Directors of the Felixstowe and Walton Water-Works Company 395 £10 4½ per cent. non-cumulative preference shares were sold at par. In the Limpsfield and Oxted Water Company, a new issue of £10 "E" ordinary shares was offered, and 210 were disposed of at £13 10s. each. They rank for a maximum dividend of 7 per cent. with shares already receiving this rate. Finally, £1000 of new ordinary "B" stock in the Southend Gas Company (receiving 5⅞ per cent. per annum) sold at from £107 10s. to £105 per £100; £346 of original consolidated stock (receiving 5⅞ per cent. per annum), at £112 per £100; and £200 of 4 per cent. perpetual debenture stock, at £92 per £100.

The Fusing Wire Suspected.—Much excitement was caused in Long Acre last Thursday by an outbreak of fire on the premises of Butterick's Publishing Company. The London Fire Brigade, however, got to work with their usual promptness, and quelled what, owing to the inflammable stock of paper patterns, &c., might have proved a very serious conflagration. The outbreak, which occurred in one of the pattern-rooms, was believed to have been caused by the fusing of an electric wire.

Results at Newbury.—The Gas Committee have reported to the Newbury Town Council that there was a gross profit on the undertaking for the year ended March 31 of £3572; the surplus available for disposal, after payment of interest, income-tax, sinking fund, and capital charges paid out of revenue, being £428. Of this, £300 is to go in aid of the rates. While coal cost more, residuals realized less. Acknowledgment was made of the valuable services rendered by the Gas Manager (Mr. W. R. Davey). The quantity of gas sold was just under 74 million cubic feet.

Lighting of Preston.—The Preston Town Council have adopted a recommendation of the Streets and Buildings Committee that they should enter into a contract with the Gas Company for the provision and maintenance of 90 1000-candle lamps for lighting the central area of the town; the proposal being the outcome of experiments of over two years' duration with gas and electric lamps. The Committee said the conclusion they had come to was that "one light was as good as another;" but as gas was the cheaper, they recommended that the Gas Company's tender should be accepted. This would save them £3040 on a seven-years' contract; and it would also save them £4300 in this period on what they were paying at present to light the same area with electricity and gas, while they would get 100 per cent. more light.

Appreciation at Leek.—On behalf of the Gas Committee of Leek, Mr. Furmston expressed, at the last meeting of the Urban District Council, their high appreciation of the work done for the town during the past seven years by Mr. S. T. Smith, who has resigned the position of Gas Engineer on his appointment to Malvern. The Committee considered he had been an admirable Manager. In response, Mr. Smith thanked the Committee for the kindness they had shown him, which had enabled him to go on with the work, though there had been a considerable struggle to bring the works up to their present condition of efficiency. They had to remember that the rise in the price of coal from 1907 to 1914 had been equal to £1800, and they had also considerably reduced the price of gas, equal to £400 a year; so that there was a difference equal to £2200, and they had only given £1000 less to the rates.

An Echo of the Leeds Strike.—An application was made by Mr. W. Wood that the Leeds City Council should receive a deputation, including Mr. J. R. Clynes, M.P., who was prepared to state the case for the old employees of the Corporation who had not been reinstated since the strike. The Council declined to accede to the request.

Stockport Gas Profits.—Increased expenditure due to higher wages and the enhanced price of coal, together with a decreased income from residuals, has caused a reduction in the profits of the Stockport Corporation gas undertaking to the extent of some £12,000. In consequence, the Gas Committee are only able to give £12,000 in relief of the rates, or £10,000 less than last year.

Dublin Townships' Lighting Schemes.—At a meeting of the Blackrock Urban Council, in connection with the recent opposition to the Alliance and Dublin Consumers' Gas Company's Bill for electric lighting supply in the Dublin township areas, disapproval was expressed by Mr. M'Cabe (the Vice-Chairman) and Mr. C. M. Byrne of a letter written by Mr. F. Stokes (the Chairman of the Finance Committee) to the Company. This was stated to have been relied upon as showing that negotiations had been proceeding with the Company up to the last minute in the interests of both parties, as to a postponement of the Parliamentary Committee's investigation, and urging that the Council might adopt the Company's scheme, with probably some alteration. Mr. Stokes claimed that he was justified in writing the letter. He had no interest in the Company, but was out for the best terms; and the Gas Company had made an ample offer of 4¼d. and 1¼d. per unit for current, against their own local scheme of 5d. and 2d. per unit. The Council's deputation to London reported that their application for costs was rejected largely because of statements in the letter.

The offices of "London Gas Controller, Limited," have been removed from Lever Street, City Road, to No. 59, Farringdon Road, E.C.—part of the premises occupied by Messrs. James Milne and Son.

The Holmfirth Gas Company have decided to supply, free of charge, all consumers so desiring a gas-ring for boiling water. All that the consumers have to do is to notify their requirement to the Company.

The Continental Union Gas Company, Limited, will pay, on July 4, an interim dividend of 2 per cent. on the ordinary stock, together with the half-yearly dividend of 3½ per cent. on the preference stock, in both cases less income-tax.

The Harrogate Gas Company have decided upon additions to their works in Ripon Road, and are to erect a new power and exhauster house. Mr. Harry Wilkinson, the Secretary and General Manager, is dealing with the tenders.

With a capital of £20,000 in £12,500 of 10 per cent. cumulative preference shares, and £7500 of ordinary shares of £1 each, the firm of David Anderson and Co. (incandescent patentees) was registered on the 25th ult. as a limited liability concern.

The Braintree and Bocking Gas Company, Limited, was registered on the 25th ult.—a re-registration of the old Company—with a capital of £20,000, in 1200 original shares and 800 additional shares of £10 each. The Company's offices are at No. 20, Victoria Street, S.W.

The Richmond Gas Stove and Meter Company, Limited, forward from their Queen Victoria Street office a copy of their spring list, with an attractive cover, and containing illustrated particulars of apparatus for the economical and efficient use of gas for cooking, water heating, and other purposes. There is also a separate pamphlet dealing with the firm's cast-iron geysers.

Members of the Foremen's Association of the Glasgow Corporation Gas Department, to the number of over eighty, last Saturday visited the United Co-Operative Bakery in M'Neil Street—the largest of its kind in Britain, if not in the world. Many interesting sights were seen; and at the close of the inspection the visitors were entertained at high tea in the St. Mungo Hall.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

SECRETARY AND MANAGER. Exmouth Gas Company. Applications by June 10.
ELECTRICIAN AND MECHANIC. Stretford Gas-Works.
RENTAL CLERK. Norwich Gas-Works.
TRAVELLERS. G. J. Eveson, Birmingham.
WORKING MANAGER. No. 5889.

Plant, &c. (Second Hand), for Sale.

EXHAUSTERS. Coal Distillation Company, Middlesbrough.
LAMP COLUMNS. York Gas Company.
PURIFIERS, &c. South Bank, &c., Gas Company.

Plant, &c. (Second Hand), Wanted.

RAILWAY TANK. No. 5884.
TOWER SCRUBBER. No. 5888.

Gas-Works Wanted.

"D. G.," c/o Scripps's Advertising Offices.

Patent Licences, &c.

COKING COAL. Haseltine, Lake, and Co., 28, Southampton Buildings, W.C.
REGULATORS FOR WATER-HEATERS. F. Bosshardt and Co., 4, Corporation Street, Manchester.

Sales of Stocks and Shares.

BRENTFORD GAS COMPANY. London Mart. June 16.
BROADSTAIRS GAS COMPANY. London Mart. June 16.
GRAYS AND TILBURY GAS COMPANY. London Mart. June 9.
HARROW GAS COMPANY. London Mart. June 9.
HERNE BAY GAS AND ELECTRICITY COMPANY. London Mart. June 23.
ROCHESTER, &C., GAS COMPANY. London Mart. June 16.
SOUTH ESSEX WATER COMPANY. London Mart. June 9.
SOUTH SUBURBAN GAS COMPANY. London Mart. June 30.
SOUTHEND WATER COMPANY. London Mart. June 23.
SOUTHGATE GAS COMPANY. London Mart. June 23.
WORTHING GAS COMPANY. London Mart. June 23.

Capital Wanted.

"LAMP," c/o Goulds, 54, New Oxford Street, W.C.

TENDERS FOR

Coal and Cannel.

ATHERTON URBAN DISTRICT COUNCIL. Tenders by June 10.
AUDLEY URBAN DISTRICT COUNCIL. Tenders by June 9.
BELFAST CORPORATION. Tenders by June 11.
CHORLEY CORPORATION. Tenders by June 16.
GLASGOW GAS DEPARTMENT. Tenders by June 9.
NEWRY GAS DEPARTMENT. Tenders by June 11.
NORTHAMPTON GAS COMPANY. Tenders by June 8.
PETERBOROUGH GAS COMPANY. Tenders by June 8.
SAFFRON WALDEN GAS AND WATER DEPARTMENT. Tenders by June 27.
SEAFORD GAS COMPANY. Tenders by June 10.
SPALDING GAS DEPARTMENT. Tenders by June 8.
WELLINGTON GAS COMPANY. Tenders by June 20.

General Stores (Glass, Lime, Benzol, Naphtha, Oils, B.O.V., Castings, Ironmongery, Iron and Steel).

CHORLEY CORPORATION. Tenders by June 16.
KEIGHLEY GAS DEPARTMENT. Tenders by June 10.
STOKE-ON-TRENT GAS DEPARTMENT. Tenders by June 11.

Lamps, Columns, &c.

CALCUTTA CORPORATION. Tenders by July 20.
STOKE-ON-TRENT GAS DEPARTMENT. Tenders by June 11.

Oxide of Iron.

CHORLEY CORPORATION. Tenders by June 16.
KEIGHLEY GAS DEPARTMENT. Tenders by June 10.

Pipes, &c.

KEIGHLEY GAS DEPARTMENT. Tenders by June 10.
STOKE-ON-TRENT GAS DEPARTMENT. Tenders by June 11.

Tar and Liquor.

ATHERTON URBAN DISTRICT COUNCIL. Tenders by June 10.
HOYLAKE GAS AND WATER COMPANY. Tenders by June 12.
NORTHWICH GAS COMPANY. Tenders by June 6.
READING GAS COMPANY. Tenders by June 15.
STOKE-ON-TRENT GAS DEPARTMENT. Tenders by June 11.

Washer and Washer Scrubber.

MANCHESTER GAS DEPARTMENT. Tenders by June 18.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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